

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

Most of the cropland in the survey area is not irrigated. Winter wheat is the most common crop.

Oats, barley, alfalfa hay, and tame grass hay are the other principal crops grown in the survey area. Summer fallow in alternate years is used as a moisture conservation practice in raising small grain crops. There is a small amount of irrigated land in the county. The principal irrigated crop grown is alfalfa.

General management needed for crops and for hay is suggested in this section. The system of land capability classification used by the Natural Resources Conservation Service is explained, and the estimated yields of the main crops and hay 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 Natural Resources Conservation Service or the Cooperative Extension Service.

Soil erosion by wind is a major resource concern in the cropland areas of the county. Water erosion can also be a hazard on cropland. Cropland can be treated by applying resource management systems that include practices such as crop residue management, conservation cropping sequences, nutrient management, pest management, and irrigation water management. Practices such as wind stripcropping, conservation cover, terraces, diversions, field windbreaks, and other practices may be used to compliment the basic conservation system. Resource management systems can be applied to pasture and haylands by applying conservation practices such as pasture and hayland planting, pasture and hayland management, pest management, nutrient management, and irrigation water management. Other practices such as planned grazing systems, livestock watering troughs or tanks, and fencing may also be used.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year,

yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The 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 erosion control and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that ensures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for

rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

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

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

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w*, *s*, or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

The capability class or subclass of each soil is shown in table 5 and is also given in the section "Detailed Soil Map Units."

Water Quality in Agriculture

The potential for impacting the quality of surface or groundwater should be considered in the planning and management of all agricultural operations. The potential for impacting water quality exists whenever pesticides, fertilizers, and manures are used in proximity to surface waters or aquifers. Removal of these materials from the application site by surface water runoff and soil leaching is the main hazard.

Impairment by Pesticides

Water quality impairment can occur if pesticides are leached below the root zone or enter a water body attached to suspended sediment or in solution of runoff waters. The potential for loss of pesticides by surface water runoff or leaching is a combined function of soil and pesticide properties, climate factors, kind of crop, and application method.

To minimize the potential for surface or groundwater quality impairment by pesticides, the use of a pest management system is recommended. Pest management systems target infestations of weeds, insects, or disease. These systems reduce the adverse effects of pest infestations on plant growth and crop production while minimizing adverse effects to environmental resources. These systems utilize the most appropriate measures or combinations of measures for pest control, including biological, cultural and chemical, while considering environmental effects, health hazards, and economic benefits. Field scouting and economic thresholds are used to determine if pesticides should be used and the time of application. Only necessary and properly timed applications of pesticides are utilized.

In a pest management system, the time of application is chosen with consideration of the soil moisture condition, anticipated weather condition, and irrigation schedule. Proper timing of application reduces the potential for loss by leaching or surface water runoff. Erosion control practices are used to minimize soil loss, surface water runoff, and the transport of adsorbed or dissolved pesticides to surface waters.

Characteristics of pesticides; such as solubility, toxicity, degradation, and absorption; are considered in pesticide selection. Soil, geology, depth to water table, proximity to surface water, topography, and climate are site characteristics which affect pesticide transport. This information on pesticide properties and site characteristics is considered when selecting pesticides to minimize their potential to impair surface and groundwater quality.

In table 6, the soils in the survey area have been rated on their relative potential for pesticide loss to leaching and surface water runoff. These ratings and the information on pesticide properties, climate, kind of crop, and application method are used to determine the potential for water quality impairment.

The soil leaching and surface loss potential ratings given in table 6 were developed from information on soil parameters. These ratings represent the relative capacity of a soil to retain a pesticide at the point of application, regardless of management or climatic inputs. The properties of pesticides, climatic factors, kind of crop, and application method were not considered in the development of these ratings.

The soil properties and features used in the development of the ratings for potential pesticide loss to soil leaching are those that affect the infiltration rate, permeability, and pesticide attenuation capacity. These soil properties are soil texture, surface layer thickness, organic matter content, structure, bulk density, permeability of soil or bedrock, shrink-swell potential, depth to bedrock, depth to a water table, and slope. Infiltration rate is interpreted from the hydrologic soil group and slope.

The soil properties and features considered in the ratings for potential pesticide loss to surface water runoff are those that affect rates of runoff and erosion. They include soil texture, organic matter content, structure, particle size distribution, permeability, restricting layers, soil depth, depth to water table, flooding, slope, and shrink-swell.

A rating of slight indicates a slight probability for loss of pesticides if pesticides with very small, small, or medium loss potentials are used, and a moderate probability of pesticide loss if pesticides with a large potential for loss are used. A rating of moderate indicates a slight probability for loss of pesticides if pesticides with very small or small loss potentials are used, and a moderate probability of pesticide loss if pesticides with a medium or large potential for loss are used. A rating of severe indicates a moderate probability for loss of pesticides if pesticides with very small or small loss potentials are used, and a high probability of pesticide loss if pesticides with a medium or large potential for loss are used.

In these ratings, the pesticide is considered to have been applied to bare soil by either surface or aerial methods. If the pesticide is applied onto a field of a growing crop or weeds, the potential for pesticide loss will be lower. Information on pesticide properties can be obtained from the local office of the Natural Resources Conservation Service or Extension Service or from pesticide dealers.

If the possibility for pesticide loss by soil leaching or surface water runoff is identified, an onsite evaluation is usually necessary to determine the potential impacts on water quality. If water quality will be affected, the land user should consider alternative pesticides, alternative management practices, alternative application methods, or cultural or biological pest control methods to reduce the possibility of pesticide losses to leaching or surface water runoff.

Impairment by Nutrients

An adequate and timely supply of nutrients is necessary for maximum crop production. Thus, it is important that nutrients added to the soil are efficiently used as amounts in excess of crop needs may become a potential pollutant. The rate of fertilizer application is important in minimizing the losses by leaching and surface water runoff. The amount of fertilizer applied should be based on a realistic yield goal. A proper balance of essential nutrients and soil moisture is necessary. A deficiency of one element may reduce the use of other nutrients by the crop. The nutrients which have not been used by the crop are available for offsite transport. Soil tests are an important guide to the proper use of fertilizers. These tests, combined with information about soil type, previous cropping history, and anticipated soil moisture level, should be used to estimate fertilizer requirements. Use of crops which require a small amount of nitrogen, like legumes, in rotation with crops that require a large amount of nitrogen reduces the potential for nutrient loss. Use of ammonium nitrogen fertilizers, such as anhydrous ammonia, can be used to help reduce nitrate leaching. If practical, all fertilizer should be incorporated into the soil to reduce the loss by volatilization and surface water runoff.

Proper timing of fertilizer applications can be effective in reducing the potential losses of nutrients. Nitrogen should be applied as closely to the plant demand periods as possible. Split applications of nitrogen, especially on sandy soils, helps reduce leaching losses. Apply half of the requirement at planting time and the other half at the critical growth stage of the crop.

Irrigation water management is very effective in reducing the amount of nitrogen leached from irrigated fields. Irrigation efficiency must be high at all times to reduce the amount of leaching due to deep percolation.

Using practices for erosion and runoff control reduces the amount of nitrogen or phosphorus transported to surface waters. Maintaining adequate amounts of crop residue on the surface and

maintaining good soil tilth increases water infiltration and reduces the potential for nutrient loss by surface water runoff.

Rangeland

Bob Baumgartner, Area Range Conservationist, Natural Resources Conservation Service, assisted in the preparation of this section.

About 90 percent of Niobrara County is rangeland. More than 80 percent of farm income is from livestock, principally cattle. Most ranches are cow-calf-yearling enterprises. The average size of a ranch is about 5,000 acres.

Niobrara County lies within two precipitation zones. The northern two-thirds lies within the 10- to 14-inch precipitation zone; while the southern one-third lies within the 15- to 17-inch precipitation zone. That portion in the 10-to 14-inch precipitation zone has winters with relatively light snow cover and extended periods of supplemental feeding of livestock are not necessary. That portion of the county in the 15- to 17-inch precipitation zone has heavier snowfalls, which cover the ground for longer periods, and supplemental feeding is required in some years. The entire county is well suited to livestock grazing.

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

The "Detailed Map Unit Descriptions" provide information on soil properties and discuss the factors that limit range management or improvement practices.

Table 7 shows, for each soil, 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. Explanations of the column headings in table 7 follow.

A *range site* is a distinctive kind of rangeland that produces a characteristic natural plant community that differs from natural plant communities on other range sites in kind, amount, and proportion of range 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 are also important.

Total production is the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

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, the grasses, forbs, and shrubs that make up most of the potential natural plant community on each soil, is listed by common name. Under *composition*, the expected percentage of the total annual production is given for each species making up the characteristic vegetation. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season.

Range management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range condition. Range condition is determined by comparing the present plant community with the potential natural plant community on a particular range site. The more closely the existing community resembles the potential community, the better the range condition. Range condition is an ecological rating only. It does not have a specific meaning that pertains to the present plant community in a given use.

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 undesirable brush 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.

Range management practices which are important to maintain productivity are proper grazing use and a

planned grazing system. These practices include proper distribution of livestock, proper season of use, and deferred grazing. Adequate livestock watering facilities, fences, and proper salt placement are needed to obtain proper grazing use. Range improvement practices such as brush management, range seeding, and mechanical range renovation can be used to improve deteriorated rangeland. These practices, if used, should be planned with knowledge of the soils and climate of the area.

Windbreaks and Environmental Plantings

Richard Rintamaki, State Biologist, Natural Resources Conservation Service, Casper, Wyoming, assisted in the preparation of this section.

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 and snow management objectives. 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, reduce building heating and cooling costs, and reduce noise. Tree and shrub plantings can also reduce wave action on ponds and harvest snow for stockwater, wildlife water, and irrigation water.

Table 8 shows the height that selected adaptable trees and shrubs are expected to reach, given adequate care, in 20 years for each represented soil group and planting zone. The windbreak suitability grouping for every soil in a detailed soil map unit is listed in the description of each map unit in the section "Detailed Soil Map Units." Definitions of the windbreak suitability groups are given below. All of the survey area is within planting zone I. This information can be used as a guide in planning windbreaks and other tree and shrub plantings.

Adaptability for planting trees and shrubs in Wyoming was based on each plant species' tolerance for the minimum and maximum air temperatures, soil temperatures of an area, and data and observations collected from woody plant material trials and existing windbreaks.

Additional information on planning windbreaks and other environmental plantings as well as planting and

caring for trees and shrubs can be obtained from local offices of the Natural Resources Conservation Service, the Cooperative Extension Service, or from a commercial nursery.

The windbreak suitability groups in this survey area are described in the following paragraphs.

Windbreak suitability group 1. The soils in this group are very deep or deep and somewhat poorly drained to well drained. They have loamy surface layers and subsoils and have less than 35 percent rock fragments by volume throughout. Available water capacity of the soil is more than 7.5 inches. In the upper 12 inches of the soil, the pH is less than 7.9, the electrical conductivity is less than 2 millimhos per centimeter, and carbonates are generally absent, but never exceed 5 percent calcium carbonate equivalent. Depth to a water table during the growing season is 3 to 5 feet or the site receives beneficial moisture from surrounding landscapes or frequent flooding.

This group is well suited for windbreaks and environmental plantings. Planting may be delayed for a short period in spring because of wetness. The water table in the soils in this group provides moisture to the trees and shrubs once they have established roots to the depth of the water table.

Windbreak suitability group 1H. The soils in this group are organic (peat) and moderately deep to very deep. Available water capacity of the soil is more than 7.5 inches. In the upper 12 inches of the soil, the pH is less than 7.9, and the electrical conductivity is less than 4 millimhos per centimeter. Depth to the water table during the growing season is 3 to 5 feet or the site receives beneficial moisture from surrounding landscapes or frequent flooding.

This group is moderately well suited for windbreaks and environmental plantings. Planting may be delayed for a short period in spring because of wetness. Because these soils are dominantly composed of peat, special planting considerations are necessary. The water table in the soils in this group provides moisture to the trees and shrubs once they have established roots to the depth of the water table.

Windbreak suitability group 1KK. The soils in this group are very deep or deep and somewhat poorly drained to well drained. They have loamy surface and subsoil layers and have less than 35 percent rock fragments by volume throughout. Available water capacity of the soil is more than 7.5 inches. In the upper 12 inches of the soil, the pH values range from 7.9 to 8.4, the electrical conductivity is less than 4 millimhos per centimeter, and carbonates range from 15 to 40 percent calcium carbonate equivalent.

Depth to a water table during the growing season is 3 to 5 feet or the site receives beneficial moisture from surrounding landscapes or frequent flooding.

This group is moderately suited for windbreaks and environmental plantings. Planting may be delayed for a short period in the spring because of wetness. The very high carbonates and high pH in the soil significantly limit the selection and rate of growth of trees and shrubs. The water table in the soils in this group provides moisture to the trees and shrubs once they have established roots to the depth of the water table.

Windbreak suitability group 1KW. The soils in this group are very deep or deep and somewhat poorly drained to well drained. They have loamy surface and subsoil layers and have less than 35 percent rock fragments by volume throughout. Available water capacity of the soil is more than 7.5 inches. In the upper 12 inches of the soil, the pH values range from 7.9 to 8.4, the electrical conductivity is less than 4 millimhos per centimeter, and carbonates range from 5 to 15 percent calcium carbonate equivalent. Depth to a water table during the growing season is 3 to 5 feet or the site receives beneficial moisture from surrounding landscapes or frequent flooding.

This group is moderately well suited for windbreaks and environmental plantings. Planting may be delayed for a short period in the spring because of wetness. The amount of carbonates and high pH in the soil slightly limit the selection and rate of growth of trees and shrubs. The water table in the soils in this group provides moisture to the trees and shrubs once they have established roots to the depth of the water table.

Windbreak suitability group 2. The soils in this group are very deep or deep, poorly drained to somewhat poorly drained, and excessively wet or ponded during the spring or overflow periods. These soils range from sandy to clayey. Rock fragments in the soil may range up to 60 percent by volume. Available water capacity of the soil is more than 2 inches. In the upper 12 inches of the soil, the pH is less than 7.9, the electrical conductivity is less than 2 millimhos per centimeter, and carbonates are generally absent but never exceed 5 percent calcium carbonate equivalent. Depth to a water table during the growing season is 1.5 to 3 feet.

This group is moderately well suited for windbreaks and environmental plantings. Special planting considerations will be necessary because these soils are wet during the growing season. Wetness limits the rooting depth and survival of some species. The selection of trees and shrubs should be based on this limitation.

Windbreak suitability group 2H. The soils in this group are organic (peat), very deep or deep, and poorly drained to somewhat poorly drained. Available water capacity of the soil is more than 7.5 inches. In the upper 12 inches of the soil, the calcium carbonate equivalent is less than 1 percent, the pH is less than 7.9, and the electrical conductivity is less than 2 millimhos per centimeter. Depth to a water table during the growing season is 1.5 to 3 feet.

This group is moderately suited for windbreaks and environmental plantings. Because these soils are wet and dominantly composed of peat, special planting considerations are necessary. Wetness limits the rooting depth and survival of some species. The selection of trees and shrubs should be based on this limitation.

Windbreak suitability group 2KK. The soils in this group are very deep or deep, poorly drained to somewhat poorly drained, and excessively wet or ponded during the spring or overflow periods. These soils range from sandy to clayey. Rock fragments in the soil may range up to 60 percent by volume. Available water capacity of the soil is more than 2 inches. In the upper 12 inches of the soil the pH ranges from 7.9 to 8.4, the electrical conductivity is less than 4 millimhos per centimeter, and carbonates range from 15 to 40 percent calcium carbonate equivalent. Depth to a water table during the growing season is 1.5 to 3 feet.

This group is moderately suited for windbreaks and environmental plantings. Special planting considerations will be necessary because these soils are wet during the growing season. The very high amount of carbonates and high pH in the soil significantly limit the rate of growth of trees and shrubs. Wetness limits the rooting depth and survival of some species. The selection of trees and shrubs should be based on these limitations.

Windbreak suitability group 2KW. The soils in this group are very deep or deep, poorly to somewhat poorly drained, and excessively wet or ponded during the spring or overflow periods. These soils range from sandy to clayey. Rock fragments in the soil may range up to 60 percent by volume. Available water capacity of the soil is more than 2 inches. In the upper 12 inches of the soil the pH values range from 7.9 to 8.4, the electrical conductivity is less than 4 millimhos per centimeter, and carbonates range from 5 to 15 percent calcium carbonate equivalent. Depth to a water table during the growing season is 1.5 to 3 feet.

This group is moderately suited for windbreaks and environmental plantings. Special planting considerations will be necessary because these soils

are wet during the growing season. The amount of carbonates and high pH in the soil moderately limit the rate of growth of trees and shrubs. Wetness limits the rooting depth and survival of some species. The selection of trees and shrubs should be based on these limitations.

Windbreak suitability group 3. The soils in this group are very deep or deep and moderately well to well drained. They have loamy surface and subsoil layers and have less than 35 percent rock fragments by volume throughout. Available water capacity of the soil is more than 7.5 inches. In the upper 12 inches of the soil, the pH is less than 7.9, the electrical conductivity is less than 2 millimhos per centimeter, and carbonates are generally absent, but never exceed 5 percent calcium carbonate equivalent. Depth to a water table during the growing season is more than 5 feet.

This group is well suited for windbreaks and environmental plantings.

Windbreak suitability group 4. The soils in this group are moderately deep to very deep and moderately well drained to well drained. The upper 8 to 20 inches of the soil is loamy. Below this depth the soils are clayey. Rock fragments throughout the soil may range to 60 percent by volume. Available water capacity of the soil to underlying bedrock is more than 5 inches. In the upper 12 inches of the soil, the pH is less than 7.9, the electrical conductivity is less than 2 millimhos per centimeter, and carbonates are generally absent, but never exceed 5 percent calcium carbonate equivalent. Depth to a water table during the growing season is more than 5 feet.

This group is moderately well suited for windbreaks and environmental plantings. A high content of clay in the lower part of the soil moderately limits the selection and rate of growth of trees and shrubs. The droughtiness of the moderately deep soils in this group is also a limiting factor.

Windbreak suitability group 4C. The soils in this group are moderately deep to very deep and moderately well drained to well drained. Typically these soils are clayey throughout. However, the upper 8 inches may be loamy. Rock fragments throughout the soil may range to 60 percent by volume. Available water capacity of the soil to underlying bedrock or other restrictive layers is more than 3.75 inches. In the upper 12 inches of the soil, the pH is less than 7.9, the electrical conductivity is less than 2 millimhos per centimeter, and calcium carbonate equivalent does not exceed 5 percent. Depth to a water table during the growing season is more than 5 feet.

This group is moderately suited for windbreaks and environmental plantings. The high content of clay limits the selection and rate of growth of trees and shrubs. The droughtiness of the moderately deep soils in this group is also a limiting factor. Because of the high content of clay, extra care is needed to ensure that the soil is firmly packed around the roots when trees and shrubs are planted.

Windbreak suitability group 4CK. The soils in this group are moderately deep to very deep and moderately well drained to well drained. Typically these soils are clayey throughout. However, the upper 8 inches may be loamy. Rock fragments throughout the soil may range to 60 percent by volume. Available water capacity of the soil to underlying bedrock or other restrictive layers is more than 3.75 inches. In the upper 12 inches of the soil, the pH ranges from 7.9 to 8.4, the electrical conductivity is less than 4 millimhos per centimeter, and the calcium carbonate equivalent ranges from 5 to 15 percent. Depth to a water table during the growing season is more than 5 feet.

This group is moderately suited for windbreaks and environmental plantings. The high content of clay, high pH, and amount of carbonates moderately limit the selection and rate of growth of trees and shrubs. The droughtiness of the moderately deep soils in this group is also a limiting factor. Because of high content of clay, extra care is needed to ensure that the soil is firmly packed around the roots when trees and shrubs are planted.

Windbreak suitability group 4K. The soils in this group are moderately deep to very deep and moderately well drained to well drained. The upper 8 to 20 inches of the soil is loamy. Below this depth the soils are clayey. Rock fragments throughout the soil may range to 60 percent by volume. Available water capacity of the soil to underlying bedrock or other restrictive layers is more than 5 inches. In the upper 12 inches of the soil, the pH ranges from 7.9 to 8.4, the electrical conductivity is less than 4 millimhos per centimeter, and carbonates range from 5 to 15 percent calcium carbonate equivalent. Depth to a water table during the growing season is more than 5 feet.

This group is moderately suited for windbreaks and environmental plantings. The high content of clay in the lower part of the soil, the amount of carbonates, and the high pH moderately limit the selection and rate of growth of trees and shrubs. The droughtiness of the moderately deep soils in this group is also a limiting factor.

Windbreak suitability group 5. The soils in this group are very deep or deep and moderately well

drained to well drained. They have loamy surface and subsoil layers. Rock fragments throughout the soil may range to 60 percent by volume. Available water capacity of the soil ranges from 3.75 to 7.5 inches. In the upper 12 inches of soil, the pH is less than 7.9, the electrical conductivity is less than 2 millimhos per centimeter, and the calcium carbonate equivalent is less than 5 percent. Depth to a water table during the growing season is more than 5 feet.

This group is moderately well suited for windbreaks and environmental plantings. The droughtiness of the soil moderately limits the selection and rate of growth of trees and shrubs.

Windbreak suitability group 5K. The soils in this group are very deep or deep and moderately well drained to well drained. They have loamy surface and subsoil layers. Rock fragments throughout the soil may range to 60 percent by volume. Available water capacity of the soil ranges from 3.75 to 7.5 inches. In the upper 12 inches of soil the pH ranges from 7.9 to 8.4, the electrical conductivity is less than 4 millimhos per centimeter, and calcium carbonate equivalent ranges from 5 to 15 percent. Depth to a water table during the growing season is more than 5 feet.

This group is moderately suited for windbreaks and environmental plantings. The amount of carbonates, high pH, and droughtiness of the soil moderately limit the selection of trees and shrubs.

Windbreak suitability group 5KK. The soils in this group are very deep or deep and moderately well drained to well drained. They have loamy surface and subsoil layers. Rock fragments throughout the soil may range to 60 percent by volume. Available water capacity of the soil ranges from 3.75 to 7.5 inches. In the upper 12 inches of soil, the pH ranges from 7.9 to 8.4, the electrical conductivity is less than 4 millimhos per centimeter, and the calcium carbonate equivalent ranges from 15 to 40 percent. Depth to a water table during the growing season is more than 5 feet.

This group is poorly suited for windbreaks and environmental plantings. The very high amount of carbonates, high pH, and the droughtiness of the soil significantly limit the selection of trees and shrubs.

Windbreak suitability group 6. The soils in this group are moderately deep over sand, gravel, and similar layers having a water permeability of more than 20 inches per hour or other layers restrictive to roots. These soils are well drained to excessively drained. The upper part of the soils is loamy and may contain up to 60 percent rock fragments by volume. Available water holding capacity of the soil to

underlying bedrock or other restrictive layers is 2.0 to 3.75 inches. In the upper 12 inches of soil, the pH is less than 7.9, the electrical conductivity is less than 2 millimhos per centimeter, and the calcium carbonate equivalent is less than 5 percent. Depth to a water table during the growing season is more than 5 feet.

This group is poorly suited for windbreaks and environmental plantings. The droughtiness of the soil significantly limits the selection and rate of growth of trees and shrubs. Providing permanent supplemental water is recommended for successful establishment and growth of trees and shrubs.

Windbreak suitability group 6D. The soils in this group are moderately deep over an impervious layer. They are well drained to excessively drained. They have loamy or clayey surface and subsoil layers. Rock fragments throughout the soil may range to 60 percent by volume. Available water capacity of the soil to underlying bedrock or other restrictive layers is more than 3.75 inches but commonly less than 7.5 inches. In the upper 12 inches of the soil, the calcium carbonate equivalent is less than 5 percent, the pH is less than 7.9, and the electrical conductivity is less than 2 millimhos per centimeter. Depth to a water table during the growing season is more than 5 feet.

This group is moderately suited for windbreaks and environmental plantings. The droughtiness of the soil moderately limits the selection and rate of growth of trees and shrubs.

Windbreak suitability group 6DK. The soils in this group are moderately deep over an impervious layer. They are well drained to excessively drained. They have loamy or clayey surface and subsoil layers. Rock fragments throughout the soil may range to 60 percent by volume. Available water capacity of the soil to underlying bedrock or other restrictive layers is more than 3.75 inches but commonly less than 7.5 inches. In the upper 12 inches of soil, the pH ranges from 7.9 to 8.4, the electrical conductivity is less than 4 millimhos per centimeter, and the calcium carbonate equivalent ranges from 5 to 15 percent. Depth to a water table during the growing season is more than 5 feet.

This group is moderately suited for windbreaks and environmental plantings. The amount of carbonates, high pH, and the droughtiness of the soil moderately limit the selection and rate of growth of trees and shrubs.

Windbreak suitability group 6G. The soils in this group are moderately deep over sand, gravel, and similar layers having a water permeability of more than 20 inches per hour. These soils are well drained

to excessively drained. The surface and subsoil layers are loamy or clayey and may contain up to 60 percent rock fragments by volume. Available water holding capacity of the soil is more than 3.75 inches but commonly less than 7.5 inches. In the upper 12 inches of the soil, the calcium carbonate equivalent is less than 5 percent, the pH is less than 7.9, and the electrical conductivity is less than 2 millimhos per centimeter. Depth to a water table during the growing season is more than 5 feet.

This group is moderately suited for windbreaks and environmental plantings. The droughtiness of the soil moderately limits the selection and rate of growth of trees and shrubs.

Windbreak suitability group 6GK. The soils in this group are moderately deep over sand, gravel, and similar layers having a water permeability of more than 20 inches per hour. They are well drained to excessively drained. The surface and subsoil layers are loamy or clayey and may contain up to 60 percent rock fragments by volume. Available water holding capacity of the soil is more than 3.75 inches but commonly less than 7.5 inches. In the upper 12 inches of soil, the pH ranges from 7.9 to 8.4, the electrical conductivity is less than 4 millimhos per centimeter, and the calcium carbonate equivalent ranges from 5 to 15 percent. Depth to a water table during the growing season is more than 5 feet.

This group is moderately suited for windbreaks and environmental plantings. The amount of carbonates, high pH, and the droughtiness of the soil moderately limit the selection and rate of growth of trees and shrubs.

Windbreak suitability group 6GKK. The soils in this group are moderately deep over sand, gravel, and similar layers having a water permeability of more than 20 inches per hour. They are well drained to excessively drained. The surface and subsoil layers are loamy or clayey and may contain up to 60 percent rock fragments by volume. Available water holding capacity of the soil is more than 3.75 inches but commonly less than 7.5 inches. In the upper 12 inches of soil, the pH ranges from 7.9 to 8.4, the electrical conductivity is less than 4 millimhos per centimeter, and the calcium carbonate equivalent ranges from 15 to 40 percent. Depth to a water table during the growing season is more than 5 feet.

This group is poorly suited for windbreaks and environmental plantings. The very high amount of carbonates, high pH, and the droughtiness of the soil significantly limit the selection and rate of growth of trees and shrubs.

Windbreak suitability group 6K. The soils in this group are moderately deep over sands, gravel, and similar layers having a water permeability of more than 20 inches per hour or other layers restrictive to roots. They are well drained to excessively drained. The surface and subsoil layers are loamy or clayey and may contain up to 60 percent rock fragments by volume. Available water holding capacity of the soil is 2.0 to 3.75 inches. In the upper 12 inches of soil, the pH ranges from 7.9 to 8.4, the electrical conductivity is less than 4 millimhos per centimeter, and the calcium carbonate equivalent ranges from 5 to 15 percent. Depth to a water table during the growing season is more than 5 feet.

This group is poorly suited for windbreaks and environmental plantings. The amount of carbonates, high pH, and the droughtiness of the soil significantly limit the selection and rate of growth of trees and shrubs. Providing permanent supplemental water is recommended for successful establishment and growth of trees and shrubs.

Windbreak suitability group 6KK. The soils in this group are moderately deep over sand, gravel, and similar layers having a water permeability of more than 20 inches per hour or other layers restrictive to roots. They are well drained to excessively drained. The surface and subsoil layers are loamy or clayey and may contain up to 60 percent rock fragments by volume. Available water holding capacity of the soil is 2.0 to 3.75 inches. In the upper 12 inches of soil, the pH ranges from 7.9 to 8.4, the electrical conductivity is less than 4 millimhos per centimeter, and the calcium carbonate equivalent ranges from 15 to 40 percent. Depth to a water table during the growing season is more than 5 feet.

This group is poorly suited for windbreaks and environmental plantings. The very high amount of carbonates, high pH, and the droughtiness of the soil significantly limit the selection and rate of growth of trees and shrubs. Providing permanent supplemental water is recommended for successful establishment and growth of trees and shrubs.

Windbreak suitability group 7. The soils in this group are very deep or deep and well drained to excessively drained. These soils are sandy and have less than 35 percent rock fragments by volume throughout. Available water capacity of the soil is more than 2 inches but commonly less than 5 inches. In the upper 12 inches of the soil, the calcium carbonate equivalent is less than 5 percent, the pH is less than 7.9, and the electrical conductivity is less

than 2 millimhos per centimeter. Depth to a water table during the growing season is more than 5 feet.

This group is poorly suited to windbreaks in areas where supplemental watering is not practical. The droughtiness of the soil significantly limits the selection and rate of growth of trees and shrubs. Providing permanent supplemental water is recommended for successful establishment and growth of trees and shrubs. Wind erosion at or near the planting site can adversely limit the health and vigor of young windbreaks. The sandy soil surface layer requires specialized site preparation, planting methods, and management to ensure successful tree and shrub plantings.

Windbreak suitability group 8. The soils in this group are very deep or deep and moderately well drained to well drained. They have loamy surface and subsoil layers and less than 35 percent rock fragments by volume throughout. Available water capacity of the soil is more than 7.5 inches. In the upper 12 inches of the soil, the calcium carbonate equivalent is 5 to 15 percent, the pH is 7.9 to 8.4, and the electrical conductivity is up to 4 millimhos per centimeter. Depth to a water table during the growing season is more than 5 feet.

This group is moderately well suited for windbreaks and environmental plantings. The amount of carbonates and high pH in the soil slightly limit the selection and rate of growth of trees and shrubs.

Windbreak suitability group 8K. The soils in this group are very deep or deep and moderately well drained to well drained. They have loamy surface and subsoil layers and have less than 35 percent rock fragments by volume throughout. Available water capacity of the soil is more than 7.5 inches. In the upper 12 inches of soil, the pH ranges from 7.9 to 8.4, the electrical conductivity is up to 4 millimhos per centimeter, and the calcium carbonate equivalent ranges from 15 to 40 percent. Depth to a water table during the growing season is more than 5 feet.

This group is poorly suited for windbreaks and environmental plantings. The very high amount of carbonates and high pH in the soil significantly limit the selection and rate of growth of trees and shrubs.

Windbreak suitability group 9C. The soils in this group are moderately deep to very deep and moderately well drained to well drained. Typically, these soils are clayey and have less than 35 percent rock fragments by volume throughout. However, the upper 8 inches may be loamy. Available water capacity of the soil to underlying bedrock or other restrictive

layers is more than 3.75 inches but commonly less than 7.5 inches. In the upper 12 inches of the soil, the electrical conductivity ranges from 4 to 16 millimhos per centimeter. Depth to a water table during the growing season is more than 5 feet.

This group is poorly suited for windbreaks and environmental plantings. The high pH and low to moderate salinity in the soil significantly limit the selection and rate of growth of trees and shrubs.

Windbreak suitability group 9L. The soils in this group are moderately deep to very deep and moderately well drained to well drained. They have loamy surface layers. The subsoil is loamy or clayey. If the subsoil is clayey, the soil has a loamy surface layer 8 inches or more thick. These soils have less than 35 percent rock fragments by volume throughout. Available water capacity of the soil to underlying bedrock or other restrictive layers is more than 3.75 inches but commonly less than 7.5 inches. In the upper 12 inches of the soil, the electrical conductivity ranges from 4 to 16 millimhos per centimeter. Depth to a water table during the growing season is more than 5 feet.

This group is poorly suited for windbreaks and environmental plantings. The high pH and low to moderate salinity in the soil significantly limit the selection and rate of growth of trees and shrubs.

Windbreak suitability group 9W. The soils in this group are poorly drained to moderately well drained and moderately deep to very deep. These soils range from sandy to clayey. In the upper 12 inches of soil, the electrical conductivity ranges from 4 to 16 millimhos per centimeter. Depth to a water table during the growing season ranges from 1.5 to 5 feet.

This group is poorly suited for windbreaks and environmental plantings. The high pH and low to moderate salinity in the soil significantly limit the selection and rate of growth of trees and shrubs. Planting may be delayed for a short period in spring because of wetness.

Windbreak suitability group 10. The soils in this group have one or more characteristics that are severely limiting to the planting and growth of trees and shrubs. Among these characteristics are: the soil depth is shallow; available water capacity of the soil to underlying bedrock or other restrictive layers is less than 2 inches; the calcium carbonate equivalent is more than 40 percent or the electrical conductivity is more than 16 millimhos per centimeter in the upper 12 inches of the soil; or a water table during the growing season is within 18 inches of the soil surface.

This group is not usually recommended for windbreaks and environmental plantings. However, onsite investigations may reveal that some tree and shrub plantings can be made with special treatments. The selection of species must be tailored to the soil conditions at the site.

Wildlife Habitat

Richard Rintamaki, State Biologist, Natural Resources Conservation Service, Casper, Wyoming, assisted in the preparation of this section.

Soils influence wildlife populations primarily through the kinds of habitat produced. Studies dating back to the 1940s show wildlife productivity directly related to soil fertility. The abundant populations of wildlife encountered by early settlers and planners were found on the best soils in a given ecological zone. While it is true some species of wildlife can be produced on all lands (soils) it is also generally true that wildlife productivity is a function of the biotic potential of the soil. The quantity and quality of most vegetative wildlife habitat elements will not exceed the capability of the soil resource, unless artificially supplied through intensive management systems.

Most wildlife habitats are created, improved, or maintained by planting suitable vegetation, manipulating existing vegetation, inducing natural establishment of desired plants, or by combinations of such measures. The behavior of soils can be predicted from knowledge of their properties. The growth habits and characteristics of plants that comprise wildlife habitat are affected by such behavior. From the appraisal of these vegetative habitat elements, the suitability of a site for various kinds of wildlife can be approximated.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

The descriptions of the general soil map units list the representative wildlife species known to occur in the general soil map unit. Wildlife habitat information was taken from the various maps and reports published by the Wyoming Game and Fish

Department, other governmental agencies, and private companies.

Information is provided in this report on the soil's capability to support irrigated and nonirrigated crops and native range plants. This report also includes soil-windbreak interpretations. Information on the existing

and potential plant communities will enable the user who has wildlife habitat requirement data to select sites for habitat management. The user can determine the intensity of plant community management needed to produce satisfactory results.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building Site Development, Sanitary Facilities, Construction Materials, and Water Management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

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

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

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps 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.

Construction Materials

Table 9 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good*, *fair*, or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

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

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed

that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 9, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a *probable* source has a layer of clean sand or gravel or a layer of sand or gravel that is 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 is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 10 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so

difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect 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 greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts

or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind 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 or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, 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 characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 11 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and

less than 52 percent sand. If 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 (AASHTO, 1986) and the Unified soil classification system (ASTM, 1993).

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

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

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 11.

Rock fragments 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates

determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and plasticity index (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 12 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 soil series under "Soil Series 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, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Moist bulk density is the weight of soil (oven-dry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the

estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability 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 to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, very fine sand, sand, and organic matter (up to 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 by water.

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

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion and the amount of soil lost. Soils are grouped according to the amount of stable aggregates 0.84 millimeters in size. These are represented idealistically by USDA textural classes. Soils containing rock fragments can occur in any group.

1. Sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are

extremely erodible, and vegetation is difficult to establish.

2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible. Crops can be grown if intensive measures to control wind erosion are used.

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control wind erosion are used.

5. Loamy soils that are less than 20 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible. Crops can be grown if measures to control wind erosion are used.

6. Loamy soils that are 20 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible. Crops can easily be grown.

7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible. Crops can easily be grown.

8. Stony or gravelly soils and other soils not subject to wind erosion.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 12, 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 of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 13 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation

are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of very deep or 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 to very deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

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

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

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 13 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as *none*, *rare*, *common*, *occasional*, and *frequent*. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs, on the average, no more than once 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; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic

matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

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

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 13 are the depth to the seasonal high water table; the kind of water table - that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in 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.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for 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 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. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series (Soil Taxonomy, USDA-SCS, 1975). Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 14 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is 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 Argid (*Arg*, meaning having a horizon with accumulated clay, 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 Haplargids (*Hapl*, meaning minimal horizonation, plus *argid*, the suborder of the Aridisols that have an illuvial horizon).

SUBGROUP. Each great group has a typical subgroup. Other subgroups are intergrades or extragrades. The typical 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

Ustollic identifies the subgroup that is more moist than that which typifies the great group. An example is Ustollic Haplargids.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, mesic Ustollic Haplargids.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series. The Forkwood series is an example of a fine-loamy, mixed, mesic, Ustollic Haplargid.

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" (Soil Survey Staff, 1993). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (USDA-SCS, 1975). Unless otherwise stated, colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Absted Series

The Absted series consists of very deep, well drained soils on alluvial fans. The soils formed in alluvium derived from sedimentary rock. Slopes range from 0 to 3 percent. Elevation is 3,600 to 4,800 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine, montmorillonitic, mesic Haplustollic Natrargids.

Typical pedon of Absted loam in an area of Absted-Cambria loams, 0 to 3 percent slopes, 2,450 feet north and 2,200 feet west of the southeast corner of sec. 28, T. 38 N., R. 62 W.

- A1—0 to 3 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; common fine and very fine roots; slightly alkaline; clear smooth boundary.
- A2—3 to 5 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; weak medium platy structure; hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; slightly alkaline; clear smooth boundary.
- Bt—5 to 10 inches; light yellowish brown (2.5Y 6/4) silty clay loam, olive brown (2.5Y 4/4) moist; moderate fine prismatic structure; hard, firm, sticky and plastic; common fine and very fine roots; many distinct clay films on faces of peds; slightly alkaline; clear wavy boundary.
- Btkn—10 to 13 inches; light yellowish brown (2.5Y 6/4) silty clay loam, olive brown (2.5Y 4/4) moist; moderate medium prismatic structure; very hard, firm, sticky and plastic; common fine and very fine roots; many distinct clay films on faces of peds; strongly effervescent, calcium carbonate occurs as few fine specks; strongly alkaline; clear wavy boundary.
- Bkn—13 to 19 inches; light yellowish brown (2.5Y 6/4) silty clay loam, olive brown (2.5Y 4/4) moist; weak medium prismatic structure; very hard, firm, sticky and plastic; few fine and very fine roots; violently effervescent, calcium carbonate occurs as few fine specks; very strongly alkaline; clear wavy boundary.
- C1—19 to 38 inches; light yellowish brown (2.5Y 6/4) clay loam, olive brown (2.5Y 4/4) moist; massive; very hard, firm, sticky and plastic; violently effervescent, calcium carbonate is disseminated; strongly alkaline; clear wavy boundary.

C2—38 to 60 inches; light yellowish brown (2.5Y 6/4) clay loam, olive brown (2.5Y 4/4) moist; massive; very hard, firm, sticky and plastic; strongly effervescent, calcium carbonate is disseminated; strongly alkaline.

Depth to horizons containing accumulations of calcium carbonate ranges from 10 to 20 inches. Content of coarse fragments is less than 5 percent throughout the soil.

The A horizon has hue of 2.5Y or 10YR, value of 15 through 7 dry, 3 through 5 moist, and chroma of 2 or 3. Texture is loam or fine sandy loam. Reaction is neutral or slightly alkaline.

The Bt and Btkn horizons have hue of 10YR through 5Y, value of 5 or 6 dry, 4 or 5 moist, and chroma of 2 through 4. They have texture of silty clay loam, silty clay, or clay and 35 to 50 percent clay. Exchangeable sodium is 3 to 12 percent in the Bt horizon, and 15 to 30 percent in the Btkn horizon. Reaction is slightly or moderately alkaline in the Bt horizon, and strongly to very strongly alkaline in the Btkn horizon. Electrical conductivity of the Btkn horizon ranges from 4 to 8 millimhos per centimeter.

The Bkn horizon has hue of 10YR through 5Y, value of 5 through 7 dry, 4 or 5 moist, and chroma of 2 through 4. Texture is clay loam, silty clay loam, or silty clay.

Exchangeable sodium is 15 to 30 percent in the Bkn horizon, and 10 to 25 percent in the C horizon. Reaction is strongly or very strongly alkaline in these horizons. Electrical conductivity is 4 to 8 millimhos per centimeter.

Albinas Series

The Albinas series consists of very deep, well drained soils on alluvial fans. The soils formed in alluvium derived from sedimentary rock. Slopes range from 0 to 6 percent. Elevation is 4,800 to 5,500 feet. The average annual precipitation is 15 to 17 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine-loamy, mixed, mesic Pachic Argustolls.

Typical pedon of Albinas loam in an area of Albinas-Recluse loams, 0 to 6 percent slopes, 1,600 feet north and 250 feet east of the southwest corner of sec. 29, T. 32 N., R. 64 W.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak

fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; neutral; abrupt smooth boundary.

AB—6 to 10 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; many fine and medium roots; neutral; clear wavy boundary.

Bt1—10 to 21 inches; brown (10YR 4/3) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to strong medium and fine angular blocky; soft, friable, slightly sticky and slightly plastic; common medium and coarse roots; many distinct and few prominent clay films on faces of peds; neutral; clear wavy boundary.

Bt2—21 to 29 inches; grayish brown (10YR 5/2) clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to strong medium and fine subangular blocky; slightly hard, friable, sticky and plastic; common medium and coarse roots; many distinct and common prominent clay films on faces of peds; slightly alkaline; clear wavy boundary.

Btk—29 to 34 inches; grayish brown (10YR 5/2) clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine roots; many faint clay films on faces of peds; strongly effervescent, calcium carbonate occurs as few fine filaments and threads; slightly alkaline; clear wavy boundary.

Bk—34 to 60 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; strongly effervescent, calcium carbonate occurs as many fine specks and few fine filaments and masses; moderately alkaline.

Depth to horizons containing accumulations of calcium carbonate ranges from 20 to 40 inches. The mollic epipedon is 20 to 40 inches thick.

The A and Bt horizons have value of 4 or 5 dry, and chroma of 2 or 3. The Bt horizon has texture of clay loam, sandy clay loam, or loam, 20 to 35 percent clay, and 35 to 50 percent fine or coarser sand. Reaction is neutral or slightly alkaline in the Bt horizon.

The Bk horizon has value of 5 or 6 dry, 3 or 4 moist, and chroma of 2 or 3. Texture is fine sandy loam or loam.

Alice Series

The Alice series consists of very deep, well drained soils on alluvial fans and terraces. The soils formed in alluvium and eolian deposits derived from sedimentary rock. Slopes range from 0 to 10 percent. Elevation is 4,800 to 5,500 feet. The average annual precipitation is 15 to 17 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are coarse-loamy, mixed, mesic Aridic Haplustolls.

Typical pedon of Alice fine sandy loam in an area of Alice-Manter fine sandy loams, 0 to 6 percent slopes, 1,000 feet south and 350 feet west of the northeast corner of sec. 36, T. 31 N., R. 67 W.

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

AB—5 to 9 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; weak coarse prismatic structure parting to weak fine subangular blocky; soft, friable, nonsticky and nonplastic; few fine and medium roots; neutral; abrupt smooth boundary.

Bw—9 to 19 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; weak coarse prismatic structure parting to weak medium and fine subangular blocky; soft, friable, nonsticky and nonplastic; few fine and very fine roots; slightly alkaline; clear smooth boundary.

Bk1—19 to 22 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; few fine roots; slightly effervescent, calcium carbonate occurs as few fine filaments and specks; moderately alkaline; clear smooth boundary.

Bk2—22 to 60 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; slightly effervescent, calcium carbonate occurs as few fine filaments and specks; moderately alkaline.

Depth to horizons containing accumulations of calcium carbonate is 13 to 20 inches. The control section is 8 to 18 percent clay. Content of coarse fragments ranges from 0 to 10 percent throughout the soil.

The A horizon has value of 4 or 5 dry and chroma of 2 or 3. Reaction is neutral or slightly alkaline.

The Bw horizon has value of 5 or 6 dry, 3 or 4 moist, and chroma of 2 or 3. Texture is commonly fine sandy loam, but is very fine sandy loam in some pedons.

The Bk horizon has value of 6 or 7 dry, 4 through 6 moist, and chroma of 2 or 3. Texture commonly is fine sandy loam or very fine sandy loam, but is loamy very fine sand below a depth of 40 inches in some pedons. Reaction is slightly or moderately alkaline.

Arvada Series

The Arvada series consists of very deep, well drained soils on alluvial fans. The soils formed in alluvium derived from sedimentary rock. Slopes range from 0 to 3 percent. Elevation is 3,600 to 4,800 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine, montmorillonitic, mesic Ustollic Natrargids.

Typical pedon of Arvada very fine sandy loam in an area of Absted-Arvada complex, 0 to 3 percent slopes, 2,100 feet north and 1,100 feet east of the southwest corner of sec. 30, T. 41 N., R. 62 W.

E—0 to 2 inches; light brownish gray (10YR 6/2) very fine sandy loam, brown (10YR 5/3) moist; moderate thin platy structure; soft, very friable, nonsticky and nonplastic; common fine and very fine roots; strongly effervescent; moderately alkaline; abrupt smooth boundary.

Btn—2 to 16 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 5/3) moist; moderate coarse columnar structure parting to moderate medium and fine subangular blocky; slightly hard, firm, sticky and plastic; common fine and very fine roots; many prominent clay films on faces of peds; strongly effervescent, calcium carbonate is disseminated; strongly alkaline; clear smooth boundary.

Btkny—16 to 24 inches; brown (10YR 5/3) silty clay, brown (10YR 4/3) moist; moderate fine and medium subangular blocky structure; slightly hard, firm, sticky and plastic; few very fine roots; few distinct clay films on faces of peds; strongly effervescent, calcium carbonate occurs as few fine filaments and threads; gypsum occurs as few

fine crystals; strongly alkaline; clear smooth boundary.

Bkny—24 to 60 inches; pale brown (10YR 6/3) silty clay loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, sticky and plastic; few very fine roots; strongly effervescent, calcium carbonate occurs as few fine filaments and threads; gypsum occurs as few fine crystals; strongly alkaline.

Depth to horizons containing accumulations of calcium carbonate is 2 to 16 inches. Content of coarse fragments is less than 5 percent throughout the soil. Hue is 10YR or 2.5Y throughout the soil. Some pedons have a thin A horizon.

The E and Btn horizons have value of 5 or 6 dry, 4 or 5 moist, and chroma of 2 through 4. Reaction in the E horizon is slightly or moderately alkaline. The Btn horizon has texture of silty clay loam, silty clay, or clay and 35 to 50 percent clay. Reaction is strongly or very strongly alkaline. Exchangeable sodium is 15 to 30 percent.

The Bkny horizon has value of 5 or 6 dry, 4 or 5 moist, and chroma of 3 or 4. Texture is silty clay loam, silty clay, or clay loam. Exchangeable sodium in this horizon is 10 to 30 percent and decreases with increasing depth. Reaction is strongly or very strongly alkaline. Electrical conductivity is 2 to 8 millimhos per centimeter.

Bahl Series

The Bahl series consists of very deep, well drained soils on alluvial fans, terraces, and footslopes of hills. The soils formed in alluvium derived from shale. Slopes range from 0 to 10 percent. Elevation is 3,600 to 4,800 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine, montmorillonitic (calcareous), mesic Ustertic Torriorthents.

Typical pedon of Bahl clay loam in an area of Savageton-Bahl clay loams, 3 to 10 percent slopes, 2,300 feet north and 1,700 feet west of the southeast corner of sec. 35, T. 37 N., R. 62 W.

A—0 to 1 inch; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak fine and medium granular structure; hard, firm, sticky and plastic; few fine roots; strongly effervescent; moderately alkaline; abrupt smooth boundary.

C—1 to 14 inches; light brownish gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) moist; massive; extremely hard, extremely firm, very sticky and very plastic; few fine roots; strongly effervescent; moderately alkaline; abrupt smooth boundary.

Cy—14 to 60 inches; light brownish gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) moist; massive; extremely hard, extremely firm, very sticky and very plastic; few very fine roots; many very soft masses of secondary gypsum; strongly effervescent; strongly alkaline.

The soil is typically effervescent throughout but is noneffervescent to a depth of 4 inches in some pedons. The control section is 35 to 55 percent clay. Electrical conductivity is less than 4 millimhos per centimeter throughout the soil. Cracks 1 to 4 centimeters wide are present from the surface to a depth of 30 to 50 inches for a period of 6 to 8 months.

The A horizon has hue of 10YR or 2.5Y, value of 5 or 6 dry, 4 or 5 moist, and chroma of 2 or 3. Texture is clay loam or clay. Reaction is slightly or moderately alkaline.

The C horizon has hue of 10YR through 5Y, value of 5 through 7 dry, 4 through 6 moist, and chroma of 2 through 4. Texture is clay loam, clay, or silty clay. Reaction is moderately or strongly alkaline.

Bayard Series

The Bayard series consists of very deep, well drained soils on terraces and alluvial fans. The soils formed in alluvium derived from sandstone. Slopes range from 0 to 3 percent. Elevation is 4,800 to 5,200 feet. The average annual precipitation is 15 to 17 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are coarse-loamy, mixed, mesic Torriorthentic Haplustolls.

Typical pedon of Bayard fine sandy loam, 0 to 3 percent slopes, 100 feet north and 1,950 feet west of the southeast corner of sec. 30, T. 32 N., R. 62 W.

A—0 to 8 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium platy structure parting to moderate fine granular; soft, very friable, nonsticky and nonplastic; few medium and many fine roots; neutral; abrupt smooth boundary.

AC—8 to 15 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure

parting to weak fine granular; soft, very friable, nonsticky and nonplastic; few medium and common fine roots; strongly effervescent, calcium carbonate is disseminated; moderately alkaline; clear wavy boundary.

C1—15 to 40 inches; light brownish gray (10YR 6/2) fine sandy loam, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few medium and common fine roots; strongly effervescent, calcium carbonate is disseminated; moderately alkaline; clear wavy boundary.

C2—40 to 60 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few medium and fine roots; slightly effervescent, calcium carbonate is disseminated; moderately alkaline.

Depth to horizons containing calcium carbonate ranges from 8 to 12 inches. The mollic epipedon is 7 to 16 inches thick. The control section is fine sandy loam or very fine sandy loam and 8 to 18 percent clay. Content of angular and rounded gravel ranges from 0 to 10 percent throughout the soil.

The A horizon has value of 4 or 5 dry, 2 or 3 moist, and chroma of 2 or 3. Reaction is neutral or slightly alkaline.

The C horizon has value of 6 or 7 dry, 4 or 5 moist, and chroma of 2 or 3. Reaction is slightly or moderately alkaline.

Bidman Series

The Bidman series consists of very deep, well drained soils on alluvial fans. These soils formed in alluvium derived from sedimentary rocks. Slope is 0 to 6 percent. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine, montmorillonitic, mesic Ustollic Paleargids.

Typical pedon of Bidman loam in an area of Bidman-Ulm association, undulating, in Weston County, in the SE1/4 of the SE1/4 of sec. 36, T. 43 N., R. 66 W.

A—0 to 4 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak thin platy structure; slightly hard, friable, slightly sticky and nonplastic; many fine and very fine roots; neutral; abrupt smooth boundary.

Bt—4 to 12 inches; pale brown (10YR 6/3) clay, brown (10YR 5/3) moist; moderate medium columnar structure parting to moderate medium subangular blocky; common fine and very fine roots; many prominent clay films on faces of peds; neutral; clear wavy boundary.

Btk—12 to 16 inches; pale brown (10YR 6/3) clay loam, grayish brown (10YR 5/2) moist; moderate medium subangular blocky structure; common fine and very fine roots; few faint clay films on faces of peds; slightly effervescent, calcium carbonate occurs as few fine threads; moderately alkaline; clear wavy boundary.

Bk1—16 to 20 inches; light brownish gray (10YR 6/2) clay loam grayish brown (10YR 5/2) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; few roots; strongly effervescent, calcium carbonate is disseminated; moderately alkaline, clear smooth boundary.

Bk2—20 to 60 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse angular blocky structure parting to massive; hard, very firm, sticky and plastic; few roots; strongly effervescent, calcium carbonate is disseminated; moderately alkaline.

Hue is 2.5Y or 10YR throughout the soil. Depth to horizons containing calcium carbonate is 8 to 20 inches.

The A and Bt horizons have neutral or slightly alkaline reaction. The A horizon has value of 5 to 7 dry, 4 or 5 moist, and chroma of 2 to 4. The Bt horizon has value of 5 or 6 dry, 4 or 5 moist, and chroma of 2 to 4. Texture of the Bt horizon is clay or clay loam.

The Bk horizon has value of 5 to 7 dry, 4 to 6 moist, and chroma of 2 to 4. Texture is clay loam or loam. Reaction is moderately or strongly alkaline.

Bowbac Series

The Bowbac series consists of moderately deep, well drained soils on alluvial fans, terraces, and footslopes of hills. The soils formed in alluvium and residuum derived from sedimentary rocks. Slopes range from 0 to 15 percent. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine-loamy, mixed, mesic Ustollic Haplargids.

Typical pedon of Bowbac sandy loam in an area of Hiland-Bowbac sandy loams, 0 to 6 percent slopes,

1,000 feet north and 2,000 feet east of the southwest corner of sec. 28, T. 36 N., R. 62 W.

A—0 to 3 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; moderate medium granular structure; soft, very friable, nonsticky and nonplastic; many fine and very fine roots; neutral; clear wavy boundary.

Bt1—3 to 8 inches; yellowish brown (10YR 5/4) sandy clay loam, brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable, sticky and plastic; common fine and very fine roots; common faint clay films on faces of peds, many distinct clay films lining pores and bridging sand grains; neutral; clear wavy boundary.

Bt2—8 to 15 inches; light yellowish brown (10YR 6/4) sandy clay loam, brown (10YR 5/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; many faint clay films on faces of peds, many distinct clay films lining pores and bridging sand grains; slightly alkaline; clear wavy boundary.

Btk—15 to 19 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; few faint clay films on faces of peds and bridging sand grains; strongly effervescent, calcium carbonate occurs as few soft masses; moderately alkaline; clear wavy boundary.

Bk—19 to 29 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 5/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; few fine and very fine roots; strongly effervescent, calcium carbonate occurs as few fine masses; moderately alkaline; clear wavy boundary.

C—29 to 35 inches; light yellowish brown (10YR 6/4) sandy loam, brown (10YR 5/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine roots; violently effervescent, calcium carbonate is disseminated; moderately alkaline; clear smooth boundary.

Cr—35 inches; weakly consolidated, effervescent sandstone.

Depth to horizons containing accumulations of calcium carbonate ranges from 10 to 20 inches. Depth to weakly consolidated sandstone ranges from 20 to 40 inches. Content of channery fragments ranges from 0 to 15 percent throughout the soil.

The A horizon has value of 4 or 5 dry, 3 or 4 moist, and chroma of 2 or 3. Reaction is neutral or slightly alkaline.

The Bt horizon has value of 5 or 6 dry, 4 or 5 moist, and chroma of 2 through 4. Reaction is neutral through moderately alkaline.

The Bk and C horizons have value of 6 or 7 dry, 5 or 6 moist, and chroma of 3 or 4. Texture is sandy loam or fine sandy loam. Reaction is moderately or strongly alkaline.

Brownrigg Series

The Brownrigg series consist of shallow, well drained soils on pediment breaks and hills. These soils formed in colluvium derived from various sources. Slopes range from 6 to 40 percent. Elevation is 3,600 to 5,500 feet. The average annual precipitation is 15 to 17 inches, the average air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are loamy-skeletal, mixed, mesic, shallow Aridic Argiustolls.

Typical pedon of Brownrigg very cobbly loam in Goshen County, 760 feet west and 1,090 feet north of the southeast corner of sec. 1, T. 27 N, R. 65 W.

A—0 to 3 inches; dark grayish brown (10YR 4/2) very cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate fine and very fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; 45 percent gravel, cobbles, and stones; slightly alkaline; clear smooth boundary.

Bt—3 to 8 inches; brown (10YR 4/3) very gravelly clay loam, dark brown (10YR 3/3) moist; strong fine and very fine subangular blocky structure; hard, firm, sticky and plastic; 50 percent gravel, cobbles, and stones; clay films bridging sand grains and few prominent clay coatings on rock fragments; slightly alkaline; clear smooth boundary.

Bk—8 to 15 inches; brown (10YR 5/3) very gravelly loam, brown (10YR 4/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; 60 percent gravel, cobbles, and stones; strongly effervescent, calcium carbonate is disseminated and occurs as coatings on rock fragments; moderately alkaline; clear wavy boundary.

Cr—15 to 20 inches; weakly consolidated, effervescent sandstone.

The A horizon has hue of 10YR or 7.5YR, value of 4 or 5 dry, 2 or 3 moist, and chroma of 2 or 3. Content

of rock fragments ranges from 45 to 60 percent. Reaction is slightly or moderately alkaline.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5 dry, 2 or 3 moist, and chroma of 2 or 3. The fine earth texture is sandy clay loam or clay loam. Content of rock fragments ranges from 45 to 60 percent. Reaction is slightly or moderately alkaline.

The Bk horizon has hue of 10YR or 7.5YR. The fine earth texture is loam or sandy clay loam. Content of rock fragments ranges from 50 to 60 percent.

Bumbob Series

The Bumbob series consists of very deep, well drained soils on alluvial fans and fan aprons. The soils formed in alluvium derived from acidic shale. Slopes range from 0 to 6 percent. Elevation is 3,800 to 4,500 feet. The average annual precipitation is 10 to 14 inches, average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are very-fine, montmorillonitic, mesic Ustertic Camborthids.

Typical pedon of Bumbob clay in an area of Bumbob-Rhoame clays, 0 to 6 percent slopes, 500 feet north and 800 feet east of the southwest corner of sec. 28, T. 38 N., R. 61 W.

A—0 to 3 inches; pale brown (10YR 6/3) clay, brown (10YR 5/3) moist; weak coarse granular structure parting to strong fine granular; hard, firm, very sticky and very plastic; few coarse and common medium and fine roots; strongly acid; clear wavy boundary.

Bw1—3 to 9 inches; pale brown (10YR 6/3) clay, brown (10YR 5/3) moist; moderate medium angular blocky structure; very hard, very firm, very sticky and very plastic; common distinct pressure faces on vertical faces of pedis; few coarse, medium, and fine roots; very strongly acid; clear wavy boundary.

Bw2—9 to 19 inches; pale brown (10YR 6/3) clay, brown (10YR 5/3) moist; moderate medium and fine angular blocky structure; very hard, very firm, very sticky and very plastic; common distinct pressure faces on vertical faces of pedis; few coarse, medium, and fine roots; extremely acid; clear wavy boundary.

C1—19 to 36 inches; pale brown (10YR 6/3) clay, brown (10YR 5/3) moist; massive; very hard, very firm, very sticky and very plastic; few fine roots; extremely acid; gradual irregular boundary.

C2—36 to 60 inches; light yellowish brown (10YR 6/4) clay, yellowish brown (10YR 5/4) moist; massive; very hard, firm, very sticky and very plastic; extremely acid.

Hue is 10YR or 2.5Y throughout the soil. Content of channery fragments is less than 5 percent throughout the soil. Cracks one to three centimeters wide are present from the surface to a depth of 30 to 50 inches for 6 to 8 months.

The A horizon value of 5 or 6 dry, 4 or 5 moist, and chroma of 2 or 3. Reaction is moderately or strongly acid.

The Bw and C horizons are 60 to 75 percent clay. The Bw horizon has value of 6 or 7 dry, 4 or 5 moist, and chroma of 2 or 3. Reaction is strongly through extremely acid. The C horizon has value of 6 or 7 dry, 4 or 5 moist, and chroma of 2 through 4. Reaction is very strongly or extremely acid. Few to common nests and crystals of gypsum occur in the C horizon in most pedons and are inherited from the parent material.

Busher Series

The Busher series consists of deep, well drained soils on valley sideslopes and shoulder slopes of hills. The soils formed in residuum and eolian deposits derived from sandstone. Slopes range from 0 to 6 percent. Elevation is 4,800 to 5,400 feet. The average annual precipitation is 15 to 17 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are coarse-loamy, mixed, mesic Aridic Haplustolls.

Typical pedon of Busher loamy very fine sand in an area of Busher-Phiferson loamy very fine sands, 0 to 6 percent slopes, 2,550 feet south and 1,100 feet east of the northwest corner of sec. 29, T. 32 N., R. 61 W.

A—0 to 5 inches; brown (10YR 5/3) loamy very fine sand, very dark grayish brown (10YR 3/2) moist; weak medium, fine and very fine granular structure; soft, friable, nonsticky and nonplastic; few medium and common fine and very fine roots; neutral; clear smooth boundary.

Bw—5 to 15 inches; brown (10YR 5/3) loamy very fine sand, dark brown (10YR 3/3) moist; weak coarse subangular blocky structure parting to weak fine granular; soft, friable, nonsticky and nonplastic; few medium and common fine and very fine roots; neutral; clear wavy boundary.

C1—15 to 34 inches; pale brown (10YR 6/3) loamy very fine sand, brown (10YR 4/3) moist; massive;

soft, friable, nonsticky and nonplastic; few medium, common fine and very fine roots; neutral; clear wavy boundary.

C2—34 to 54 inches; pale brown (10YR 6/3) loamy very fine sand, brown (10YR 4/3) moist; weak coarse block-like sandstone rock structure; soft, friable, nonsticky and nonplastic; few medium and fine roots; slightly alkaline; abrupt smooth boundary.

Cr—54 inches; weakly consolidated, noneffervescent sandstone.

Depth to bedrock ranges from 40 to 60 inches. Content of coarse fragments ranges from 0 to 10 percent throughout the soil.

The A and Bw horizons have value of 4 or 5 dry, 2 or 3 moist, and chroma of 2 or 3. Reaction is neutral or slightly acid in the A horizon, and neutral or slightly alkaline in the Bw horizon.

The Bw and C horizons commonly have texture of loamy very fine sand or very fine sandy loam, but are fine sandy loam in some pedons. The C horizon is 5 to 10 percent clay. It has value of 5 or 6 dry, 4 or 5 moist, and chroma of 2 or 3. Reaction is neutral or slightly alkaline.

This Busher soil is outside the range of the Busher series because it is noneffervescent throughout the profile. This difference, however, does not significantly affect the use and management of the soil.

Cadoma Series

The Cadoma series consists of moderately deep, well drained soils on hillslopes and dissected plains. The soils formed in alluvium derived dominantly from sodic shale. Slopes range from 2 to 20 percent. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine, montmorillonitic, mesic Ustollic Camborthids.

Typical pedon of Cadoma silty clay loam in an area of Orella-Cadoma-Rock outcrop complex, 3 to 25 percent slopes, 2,500 feet north and 1,700 feet east of the southwest corner of sec. 20, T. 38 N., R 62 W.

A—0 to 1 inch; light yellowish brown (2.5Y 6/4) silty clay loam, olive brown (2.5Y 4/4) moist; weak medium platy structure; hard, firm, sticky and plastic; common fine and few medium roots; strongly effervescent, calcium carbonate is disseminated; strongly alkaline; abrupt smooth boundary.

Bn—1 to 5 inches; light yellowish brown (2.5Y 6/4) silty clay loam, olive brown (2.5Y 4/4) moist; weak fine subangular blocky structure; hard, firm, sticky and plastic; common fine and few medium roots; strongly effervescent, calcium carbonate is disseminated; strongly alkaline; clear smooth boundary.

Bny—5 to 11 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard, firm, sticky and plastic; few fine roots; strongly effervescent; common fine masses and specks of sodium sulfate and gypsum; strongly alkaline; clear smooth boundary.

C—11 to 34 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; medium platy shale rock structure; very hard, very firm, sticky and plastic; strongly effervescent, calcium carbonate is disseminated; very strongly alkaline; gradual smooth boundary.

Cr—34 inches; weakly consolidated sodic shale.

Depth to sodic shale ranges from 20 to 40 inches. Depth to horizons containing calcium carbonate ranges from 0 to 3 inches. The control section is 35 to 50 percent clay. Content of soft plate-like shale fragments ranges from 0 to 15 percent throughout the soil. The content of channery fragments is less than 5 percent throughout the soil.

The A horizon has chroma of 2 through 4. Reaction is moderately or strongly alkaline.

The B and C horizons have value of 5 or 6 dry, 4 or 5 moist, and chroma of 2 to 4. Texture is silty clay loam, silty clay, or clay. Reaction is strongly or very strongly alkaline in the B horizon, and moderately through very strongly alkaline in the C horizon. The B and C horizons have 15 to 25 percent exchangeable sodium and electrical conductivity of 4 to 8 millimhos per centimeter.

Cambria Series

The Cambria series consists of very deep, well drained soils on alluvial fans, terraces, and footslopes of hills. The soils formed in alluvium derived from sedimentary rocks. Slopes range from 0 to 15 percent. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine-loamy, mixed, mesic Ustollic Haplargids.

Typical pedon of Cambria loam in an area of Kishona-Cambria loams, 0 to 6 percent slopes, 2,250

feet south and 650 feet east of the northwest corner of sec. 15, T. 40 N., R. 67 W.

A—0 to 4 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak very thin platy structure parting to weak very fine granular; soft, very friable, slightly sticky and slightly plastic; many fine and medium roots; neutral; clear smooth boundary.

Bt—4 to 10 inches; brown (10YR 5/3) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium prismatic structure parting to moderate medium and fine angular blocky; slightly hard, friable, sticky and plastic; common fine and medium roots; many distinct clay films on faces of peds; slightly alkaline; abrupt wavy boundary.

Btk—10 to 15 inches; light brownish gray (10YR 6/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium and fine angular blocky structure; hard, firm, sticky and plastic; few fine roots; common faint clay films on faces of peds; slightly effervescent, calcium carbonate occurs as few fine specks; moderately alkaline; clear smooth boundary.

Bk—15 to 31 inches; light gray (10YR 7/2) clay loam, brown (10YR 5/3) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; strongly effervescent, calcium carbonate occurs as few fine specks; strongly alkaline; clear smooth boundary.

C—31 to 60 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; slightly effervescent, calcium carbonate is disseminated; strongly alkaline.

Depth to horizons containing accumulations of calcium carbonate ranges from 3 to 15 inches.

The A horizon has value of 5 or 6 dry, 3 or 4 moist, and chroma of 2 or 3. Reaction is neutral or slightly alkaline.

The Bt horizon has value of 5 or 6 dry, 4 or 5 moist, and chroma of 2 or 3. Texture is clay loam or loam, 20 to 35 percent clay, and 15 to 35 percent fine or coarser sand. Reaction is slightly or moderately alkaline.

The Bk and C horizons have moderately alkaline or strongly alkaline reaction. The Bk horizon has hue of 2.5Y or 10YR, value of 5 through 7 dry, 4 through 6 moist, and chroma of 2 through 4. Texture is clay loam or loam. The C horizon has value of 5 or 6 dry, 4 or 5 moist, and chroma of 2 or 3. Texture is fine sandy

loam or loam. The C horizon is not present above a depth of 60 inches in some pedons.

Cedak Series

The Cedak series consists of moderately deep, well drained soils on footslopes, toeslopes, and shoulder slopes of hills and on dissected tablelands. The soils formed in alluvium derived from various sources. Slopes range from 0 to 10 percent. Elevation is 4,800 to 5,500 feet. The average annual precipitation is 15 to 17 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine-loamy, mixed, mesic Aridic Argiustolls.

Typical pedon of Cedak loam in an area of Recluse-Cedak loams, 0 to 6 percent slopes, 1,000 feet south and 850 west of the northeast corner of sec. 18, T. 32 N., R. 64 W.

A—0 to 4 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; soft, friable, slightly sticky and slightly plastic; many fine and very fine roots; neutral; abrupt smooth boundary.

Bt1—4 to 7 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common fine and very fine roots; common faint clay films on faces of peds; neutral; clear wavy boundary.

Bt2—7 to 15 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; many faint and common distinct clay films on faces of peds; neutral; abrupt wavy boundary.

Bk—15 to 29 inches; light brownish gray (10YR 6/2) very fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; soft, friable, nonsticky and nonplastic; few very fine roots; strongly effervescent, calcium carbonate occurs as common medium soft masses; moderately alkaline; clear wavy boundary.

Cr—29 inches; weakly consolidated, effervescent sandstone.

Depth to bedrock is 20 to 40 inches. Depth to horizons containing accumulations of calcium carbonate ranges from 15 to 25 inches. The mollic

epipedon ranges from 7 to 20 inches thick and typically includes the upper part of the argillic horizon. Content of coarse fragments is less than 10 percent throughout the soil.

The A horizon has value of 4 or 5 dry, 2 or 3 moist, and chroma of 2 or 3. Texture is loam or fine sandy loam. Reaction is neutral or slightly alkaline.

The Bt horizon has value of 4 through 6 dry, 3 or 4 moist, and chroma of 2 or 3. Texture is clay loam or loam with 18 to 35 percent clay and 15 to 35 percent fine or coarser sand. Reaction is neutral or slightly alkaline.

The Bk horizon has value of 6 or 7 dry, 5 or 6 moist, and chroma of 2 or 3. Texture is loam or very fine sandy loam. Calcium carbonate equivalent ranges from 12 to 22 percent. Reaction is moderately or strongly alkaline.

Clarkelen Series

The Clarkelen series consists of very deep, well drained soils on flood plains and stream terraces. The soils formed in alluvium derived from various sources. Slopes range from 0 to 3 percent. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are coarse-loamy, mixed (calcareous), mesic Ustic Torrifuvents.

Typical pedon of Clarkelen fine sandy loam, overflow, 0 to 3 percent slopes, 250 feet north and 100 feet east of the southwest corner of sec. 14, T. 38 N., R. 64 W.

A—0 to 6 inches; grayish brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common fine and very fine and few medium roots; slightly effervescent, calcium carbonate is disseminated; slightly alkaline; gradual smooth boundary.

C1—6 to 20 inches; light brownish gray (10YR 6/2) weakly stratified fine sandy loam and loamy fine sand, dark grayish brown (10YR 4/2) moist; massive; thin stratifications; soft, very friable, nonsticky and nonplastic; common fine and very fine and few medium roots; slightly effervescent, calcium carbonate is disseminated; moderately alkaline; abrupt wavy boundary.

C2—20 to 30 inches; light brownish gray (10YR 6/2) stratified loam and very fine sandy loam, grayish brown (10YR 5/2) moist; massive; thin

stratifications; slightly hard, friable, nonsticky and nonplastic; few fine and very fine roots; slightly effervescent, calcium carbonate is disseminated; moderately alkaline; abrupt wavy boundary.

C3—30 to 51 inches; light brownish gray (10YR 6/2) fine sand, grayish brown (10YR 5/2) moist; single grain; loose, nonsticky and nonplastic; few fine roots; slightly effervescent, calcium carbonate is disseminated; moderately alkaline; abrupt smooth boundary.

C4—51 to 60 inches; grayish brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; thin stratifications; slightly hard, friable, nonsticky and nonplastic; few fine roots; slightly effervescent, calcium carbonate is disseminated; strongly alkaline.

Hue is 10YR or 2.5Y throughout the soil. Depth to horizons containing calcium carbonate ranges from 0 to 8 inches. Content of rounded gravels is less than 10 percent throughout the soil. The particle size control section is highly stratified and averages 5 to 18 percent clay.

The A horizon has value of 4 through 6 dry, 3 through 5 moist, and chroma of 2 or 3. Texture is fine sandy loam or very fine sandy loam. Reaction is slightly or moderately alkaline.

The C horizon has value of 5 through 7 dry, 4 or 5 moist, and chroma of 2 through 4. It is highly stratified with textures of fine sandy loam, silt loam, loam, very fine sandy loam, loamy fine sand, and fine sand. Reaction is moderately or strongly alkaline. Electrical conductivity of the C horizon in pedons of the saline phase ranges from 4 to 8 millimhos per centimeter.

Coaliams Series

The Coaliams series consists of very deep, well drained soils on alluvial fans and terraces. The soils formed in alluvium derived from various sources. Slopes range from 0 to 6 percent. Elevation is 4,800 to 5,400 feet. The average annual precipitation is 15 to 17 inches, the average annual air temperature is 46 to 50 degrees F, and the average frost-free period is 110 to 130 days.

These soils are fine-loamy, mixed, mesic Torrifluventic Haplustolls.

Typical pedon of Coaliams loam, 0 to 6 percent slopes, 950 feet south and 1,900 feet west of the northeast corner of sec. 18, T. 34 N., R. 62 W.

A—0 to 7 inches; dark gray (10YR 4/1) loam, black (10YR 2/1) moist; weak medium platy structure parting to moderate medium and fine granular;

soft, very friable, slightly sticky and slightly plastic; many medium and fine roots; slightly effervescent, calcium carbonate is disseminated; slightly alkaline; clear smooth boundary.

AC—7 to 19 inches; gray (10YR 5/1) stratified loam, clay loam, and sandy clay loam, very dark gray (10YR 3/1) moist; weak medium platy structure parting to moderate medium and fine granular; slightly hard, friable, sticky and plastic; many fine, common medium roots; slightly effervescent, calcium carbonate is disseminated; moderately alkaline; clear smooth boundary.

C—19 to 60 inches; pale brown (10YR 6/3) stratified loam, clay loam, and sandy clay loam, brown (10YR 4/3) moist; massive; thick bedding planes; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; slightly effervescent, calcium carbonate is disseminated; moderately alkaline.

The soils are typically effervescent throughout, but are noneffervescent to a depth of 10 inches in some pedons. The mollic epipedon is 8 to 20 inches thick. The control section is typically stratified and averages 20 to 35 percent clay and 35 to 50 percent fine or coarser sand.

The A horizon has value of 4 or 5 dry, 2 or 3 moist, and chroma of 1 through 3. Reaction is slightly or moderately alkaline.

The C horizon has value of 5 or 6 dry, 4 or 5 moist, and chroma of 2 or 3. Texture is dominantly loam, clay loam, or sandy clay loam, but strata of very fine sandy loam, fine sandy loam, or silty clay loam of variable thickness occur throughout this horizon. Reaction is moderately or strongly alkaline.

Cushman Series

The Cushman series consists of moderately deep, well drained soils on alluvial fans, terraces, and footslopes of hills. The soils formed in residuum and alluvium derived from sedimentary rocks. Slopes range from 0 to 15 percent. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine-loamy, mixed, mesic Ustollic Haplargids.

Typical pedon of Cushman loam in an area of Forkwood-Cambria-Cushman loams, 6 to 15 percent slopes, 1,100 feet north and 200 feet west of the southeast corner of sec. 18, T. 40 N., R. 66 W.

A—0 to 3 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate fine granular structure; soft, friable, slightly sticky and slightly plastic; common fine and medium roots; neutral; clear smooth boundary.

Bt—3 to 11 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate fine angular blocky; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; many distinct clay films on faces of pedis; slightly alkaline; clear wavy boundary.

Btk—11 to 15 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; moderate medium and fine angular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; few faint clay films on faces of pedis; slightly effervescent, calcium carbonate occurs as few fine specks and filaments; moderately alkaline; gradual smooth boundary.

Bk—15 to 30 inches; very pale brown (10YR 7/3) loam, brown (10YR 5/3) moist; medium blocky shale rock structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; strongly effervescent, calcium carbonate occurs as few medium soft masses; strongly alkaline; clear wavy boundary.

Cr—30 inches; weakly consolidated effervescent shale.

Depth to bedrock is 20 to 40 inches. Depth to horizons containing accumulations of calcium carbonate ranges from 11 to 23 inches. Content of coarse fragments is less than 5 percent throughout the soil.

The A horizon has value of 5 or 6 dry, 3 or 4 moist, and chroma of 2 or 3. Reaction is neutral or slightly alkaline.

The Bt and Bk horizons have texture of clay loam or loam. The Bt horizon has value of 5 or 6 dry, 4 or 5 moist, and chroma of 2 or 3. It is 20 to 35 percent clay, and 15 to 35 percent fine or coarser sand. Reaction is slightly or moderately alkaline. The Bk horizon has value of 6 or 7 dry, 5 or 6 moist, and chroma of 2 through 4. Reaction is moderately or strongly alkaline.

Dailey Series

The Dailey series consists of very deep, well drained soils on dunes. The soils formed in eolian deposits derived from sandstone. Slopes range from 0 to 10 percent. Elevation is 4,800 to 5,400 feet. The

average annual precipitation is 15 to 17 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are sandy, mixed, mesic Torriorthentic Haplustolls.

Typical pedon of Dailey loamy sand in an area of Dailey-Orpha, moist, loamy sands, 0 to 6 percent slopes, 2,100 feet south and 2,300 feet west of the northeast corner of sec. 32, T. 32 N., R. 62 W.

A—0 to 7 inches; grayish brown (10YR 5/2) loamy sand, very dark grayish brown (10YR 3/2) moist; weak fine and very fine granular structure; soft, friable, nonsticky and nonplastic; many fine and very fine roots; neutral; clear smooth boundary.

AC—7 to 14 inches; brown (10YR 5/3) loamy sand, dark brown (10YR 3/3) moist; weak medium platy structure; soft, friable, nonsticky and nonplastic; common fine and very fine roots; neutral; clear wavy boundary.

C1—14 to 31 inches; light yellowish brown (10YR 6/4) loamy sand, brown (10YR 4/3) moist; massive; soft, friable, nonsticky and nonplastic; neutral; clear wavy boundary.

C2—31 to 60 inches; pale brown (10YR 6/3) fine sand, brown (10YR 4/3) moist; massive; soft, friable, nonsticky and nonplastic; neutral.

Reaction is neutral or slightly acid throughout the soil.

The A horizon has value of 4 or 5 dry, 2 or 3 moist, and chroma of 2 or 3. Texture is loamy sand or loamy fine sand.

The C horizon has value of 5 or 6 dry, and 4 or 5 moist, and chroma of 3 or 4. Texture is loamy sand, loamy fine sand, or fine sand.

Draknab Series

The Draknab series consists of very deep, excessively drained soils on flood plains and stream terraces. The soils formed in alluvium derived from various sources. Slopes range from 0 to 3 percent. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are sandy, mixed, mesic Ustic Torrifluvents.

Typical pedon of Draknab fine sandy loam in an area of Clarkelen-Draknab-Dwyer complex, 0 to 6 percent slopes, 2,250 feet north and 1,200 feet west of the southeast corner of sec. 23, T. 34 N., R. 63 W.

- A1—0 to 2 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak thin platy structure; soft, friable, nonsticky and nonplastic; slightly alkaline; clear smooth boundary.
- A2—2 to 5 inches; grayish brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak thin platy structure; soft, very friable, nonsticky and nonplastic; slightly alkaline; abrupt smooth boundary.
- C1—5 to 8 inches; pale brown (10YR 6/3) coarse sand, brown (10YR 5/3) moist; single grain; loose, nonsticky and nonplastic; slightly effervescent, calcium carbonate is disseminated; slightly alkaline; abrupt smooth boundary.
- C2—8 to 20 inches; pale brown (10YR 6/3) coarse sandy loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; slightly effervescent, calcium carbonate is disseminated; slightly alkaline; clear smooth boundary.
- C3—20 to 60 inches; light gray (10YR 7/2) coarse sand stratified with thin layers of sandy loam, brown (10YR 5/3) moist; single grain; loose, nonsticky and nonplastic; slightly effervescent, calcium carbonate is disseminated; slightly alkaline.

Depth to horizons containing calcium carbonate ranges from 0 to 5 inches. Content of rounded gravel commonly ranges from 0 to 15 percent throughout the soil, but in some pedons, the horizons below a depth of 40 inches contain up to 20 percent.

The A horizon has value of 5 or 6 dry, 4 or 5 moist, and chroma of 2 or 3. Texture is fine sandy loam or loamy fine sand.

The C horizon has value of 6 or 7 dry, 4 or 5 moist, and chroma of 2 through 4. Texture is dominantly coarse sand, sand, or loamy sand, but thin layers of coarse sandy loam, sandy loam, or fine sandy loam are commonly present. Reaction is slightly or moderately alkaline.

Dwyer Series

The Dwyer series consists of very deep, excessively drained soils on dunes, valley sideslopes, and footslopes of hills. The soils formed in eolian deposits derived from various sources. Slopes range from 0 to 15 percent. Elevation is 3,600 to 5,800 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are mixed, mesic Ustic Torripsamments.

Typical pedon of Dwyer fine sand in an area of Orpha-Dwyer fine sands, 0 to 6 percent slopes, 2,250 feet south and 1,150 east of the northwest corner of sec. 12, T. 38 N., R. 63 W.

- A—0 to 5 inches; brown (10YR 5/3) fine sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; common fine and medium roots; slightly effervescent, calcium carbonate is disseminated; moderately alkaline; gradual smooth boundary.
- C—5 to 60 inches; pale brown (10YR 6/3) fine sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky and nonplastic; few fine and very fine roots; strongly effervescent, calcium carbonate is disseminated; moderately alkaline.

These soils are typically effervescent throughout but are noneffervescent to a depth of 5 inches in some pedons.

The A horizon has value of 5 through 7 dry, 4 or 5 moist, and chroma of 2 or 3. Reaction is slightly or moderately alkaline.

The C horizon has hue of 2.5Y or 10YR, value of 6 or 7 dry, 4 or 5 moist, and chroma of 2 through 4. Texture is typically fine sand, but it is loamy sand or loamy fine sand in some pedons.

Epping Series

The Epping series consists of shallow, well drained soils on fan terraces and hillslopes that are dissected by numerous drainageways. The soils formed in residuum derived from siltstone. Slopes range from 3 to 50 percent. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are loamy, mixed (calcareous), mesic, shallow Ustic Torriorthents.

Typical pedon of Epping silt loam in an area of Epping-Badland complex, 3 to 50 percent slopes, 1,900 feet south and 900 feet west of the northeast corner of sec. 18, T. 34 N., R. 60 W.

- A—0 to 4 inches; light brownish gray (10YR 6/2) silt loam, grayish brown (10YR 5/2) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; common fine roots; strongly effervescent, calcium carbonate is disseminated; moderately alkaline; clear smooth boundary.

AC—4 to 8 inches; light gray (10YR 7/2) silt loam, grayish brown (10YR 5/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; strongly effervescent, calcium carbonate is disseminated; moderately alkaline; gradual smooth boundary.

C—8 to 13 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; moderate rock structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; 10 percent siltstone gravel; slightly effervescent, calcium carbonate is disseminated; moderately alkaline; abrupt wavy boundary.

Cr—13 inches; weakly consolidated, effervescent siltstone.

Depth to siltstone bedrock ranges from 10 to 20 inches. The soils are typically effervescent throughout, but are noneffervescent to a depth of 6 inches in some pedons. The control section is 10 to 20 percent clay. Content of siltstone gravel ranges from 0 to 15 percent throughout the soil. Reaction is slightly or moderately alkaline.

The A horizon has value of 6 or 7 dry, 3 through 5 moist, and chroma of 2 or 3.

The C horizon has texture of silt loam or loam.

Featherlegs Series

The Featherlegs series consists of very deep, well drained soils on pediment breaks, hills, and stream terraces and in swales. The soils formed in alluvium derived from various sources. Slopes range from 0 to 20 percent. Elevation is 4,800 to 5,500 feet. The average annual precipitation is 15 to 17 inches, the average air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine-loamy, mixed, mesic Aridic Argiustolls.

Typical pedon of Featherlegs loam, in an area of Featherlegs-Wolf loams, 0 to 6 percent slopes, in Goshen County, 2,706 feet south and 726 feet east of the northwest corner of sec. 16, T. 30 N., R. 64 W.

A—0 to 5 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium and coarse granular structure; slightly hard, very friable, slightly sticky and slightly plastic; slightly alkaline; clear smooth boundary.

BA—5 to 10 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate fine and

coarse subangular blocky structure; hard, friable, sticky and plastic; slightly alkaline; clear wavy boundary.

Bt—10 to 19 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; strong coarse and fine subangular blocky structure; very hard, firm, sticky and plastic; many prominent clay films on faces of peds; slightly alkaline; clear wavy boundary.

Btk—19 to 23 inches; light brownish gray (10YR 6/2) clay loam, grayish brown (10YR 5/2) moist; moderate fine and coarse subangular blocky structure; hard, friable, sticky and plastic; slightly effervescent, calcium carbonate is disseminated and occurs as common distinct seams; moderately alkaline; gradual wavy boundary.

Bk1—23 to 38 inches; light brownish gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; moderate coarse and fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; strongly effervescent, calcium carbonate is disseminated and occurs as seams, streaks, and soft masses; moderately alkaline; gradual wavy boundary.

2Bk2—38 to 60 inches; light brownish gray (10YR 6/2) very gravelly sandy loam, grayish brown (10YR 5/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; strongly effervescent, calcium carbonate is disseminated and occurs as coatings on the bottom of rock fragments; 60 percent gravel and cobbles; moderately alkaline.

Depth to horizons containing accumulations of calcium carbonate ranges from 10 to 20 inches. Depth to the base of the Bt horizon is 13 to 25 inches. Depth to 2Bk horizon ranges from 15 to 40 inches. The mollic epipedon is 7 to 12 inches thick. Content of gravel and cobbles ranges from 0 to 14 percent in the horizons above the 2Bk horizon and from 40 to 60 percent in the 2Bk horizon.

The A and B horizons have hue of 10YR or 7.5YR. The A horizon has value of 4 or 5 dry, 2 or 3 moist, and chroma of 2 through 4. Reaction is neutral or slightly alkaline.

The Bt and Bk horizons have value of 4 through 6 dry, 3 through 5 moist, and chroma of 2 through 4. Texture of the Bt horizon is clay loam, sandy clay loam, and loam and 22 to 35 percent clay. Calcium carbonate equivalent ranges from 15 to 40 percent in the Bk horizon and from 5 to 20 percent in the 2Bk horizon. Reaction is slightly or moderately alkaline in the Bt horizon and moderately or strongly alkaline in the Bk horizon.

Forkwood Series

The Forkwood series consists of very deep, well drained soils on footslopes of hills, alluvial fans, and terraces. The soils formed in alluvium derived from sedimentary rocks. Slopes range from 0 to 15 percent. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine-loamy, mixed, mesic Ustollic Haplargids.

Typical pedon of Forkwood loam in an area of Forkwood-Cambria loams, 0 to 6 percent slopes, 1,000 feet south and 1,100 feet west of the northeast corner of sec. 2, T. 36 N., R. 65 W.

- A—0 to 5 inches; brown (10YR 5/3) loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; many fine and medium roots; neutral; abrupt smooth boundary.
- Bt—5 to 12 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; strong medium angular blocky structure; slightly hard, friable, sticky and plastic; common fine and medium roots; common distinct clay films on faces of peds; slightly alkaline; clear smooth boundary.
- Btk—12 to 20 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; strong medium angular blocky structure; hard, firm, sticky and plastic; few fine and medium roots; few faint clay films on faces of peds; slightly effervescent, calcium carbonate occurs as few soft masses; slightly alkaline; clear smooth boundary.
- Bk1—20 to 30 inches; light brownish gray (2.5Y 6/2) loam, light olive brown (2.5Y 5/4) moist; moderate medium subangular blocky structure parting to weak fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; strongly effervescent, calcium carbonate occurs as few fine filaments and soft masses; moderately alkaline; gradual smooth boundary.
- Bk2—30 to 60 inches; light brownish gray (2.5Y 6/2) loam, grayish brown (2.5Y 5/2) moist; massive; soft, very friable, slightly sticky and slightly plastic; few fine roots; strongly effervescent, calcium carbonate occurs as few soft masses; moderately alkaline.

Depth to horizons containing accumulations of calcium carbonate ranges from 11 to 22 inches.

Content of gravel throughout the soil is commonly less than 5 percent but is 15 percent in some pedons.

The A and Bt horizons have hue of 2.5Y or 10YR. The A horizon has value of 5 or 6 dry, 4 or 5 moist, and chroma of 2 or 3. The Bt horizon has value of 5 through 7 dry, 4 or 5 moist, and chroma of 2 through 4. Texture is loam or clay loam, 25 to 35 percent clay, and 15 to 35 percent fine or coarser sand. Reaction is neutral or slightly alkaline in both horizons.

The Bk horizon has hue of 5Y through 10YR, value of 6 or 7 dry, 5 or 6 moist, and chroma of 2 through 4. Reaction is moderately or strongly alkaline. Texture of loam or clay loam. Calcium carbonate equivalent is 1 to 10 percent.

Grummit Series

The Grummit series consists of shallow, well drained soils on ridges, dip slopes, and hills. The soils formed in residuum derived from acidic shale. Slopes range from 6 to 45 percent. Elevation is 3,800 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are clayey, montmorillonitic, acid, mesic, shallow Ustic Torriorthents.

Typical pedon of Grummit clay in an area of Grummit-Hilight-Rock outcrop complex, 15 to 45 percent slopes, 1,250 feet south and 100 feet east of the northwest corner of sec. 4, T. 36 N., R. 60 W.

- A—0 to 3 inches; light brownish gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate medium granular structure; slightly hard, friable, sticky and plastic; common fine roots; 5 percent very fine soft shale fragments; strongly acid; clear wavy boundary.
- AC—3 to 8 inches; light brownish gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; common very fine and fine roots; 10 percent very fine soft shale fragments; strongly acid; clear wavy boundary.
- C—8 to 14 inches; light brownish gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) moist; weak fine and medium plate-like rock structure; hard, friable, sticky and plastic; few very fine roots; 40 percent soft shale fragments; very strongly acid; clear smooth boundary.
- Cr—14 inches; weakly consolidated, acidic shale.

Depth to shale ranges from 10 to 20 inches.

Hue is 10YR or 2.5Y throughout the soil. The A and C horizons have value of 5 or 6 dry, and chroma of 1 or 2. The A horizon has value of 3 or 4 moist. Texture is clay or clay loam. Reaction is strongly or very strongly acid. The C horizon is 40 to 60 percent clay. Content of fine and very fine plate-like soft shale fragments in this horizon ranges from 20 to 80 percent and the fragments typically increase with increasing depth. Content of channery fragments ranges from 0 to 15 percent. Reaction is strongly through extremely acid.

Hargreave Series

The Hargreave series consists of moderately deep, well drained soils on footslopes of hills, swales, and terraces. The soils formed in alluvium, residuum, and eolian deposits derived from sandstone. Slopes range from 0 to 10 percent. Elevation is 4,700 to 5,500 feet. The average annual precipitation is 15 to 17 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine-loamy, mixed, mesic Aridic Argiustolls.

Typical pedon of Hargreave fine sandy loam in an area of Hargreave-Cedak fine sandy loams, 2 to 10 percent slopes, 1,500 feet south and 1,400 feet west of the northeast of sec. 30, T. 31 N., R. 65 W.

A—0 to 5 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; loose, very friable, nonsticky and nonplastic; common fine and very fine roots; neutral; clear smooth boundary.

BA—5 to 9 inches; brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few fine and very fine roots; slightly alkaline; clear smooth boundary.

Bt1—9 to 16 inches; yellowish brown (10YR 5/4) sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; common distinct clay films bridging sand grains; slightly alkaline; gradual smooth boundary.

Bt2—16 to 20 inches; light yellowish brown (10YR 6/4) sandy clay loam, yellowish brown (10YR 5/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; few

distinct clay films bridging sand grains; slightly alkaline; gradual smooth boundary.

C—20 to 30 inches; very pale brown (10YR 7/3) fine sandy loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine roots; slightly alkaline; gradual wavy boundary.

Cr—30 inches; weakly consolidated noneffervescent sandstone.

Depth to bedrock ranges from 20 to 40 inches. The mollic epipedon ranges from 7 to 19 inches thick. These soils are typically noneffervescent throughout, but are effervescent in a small part of the C horizon in some pedons.

Reaction in the A and Bt horizons is neutral or slightly alkaline. The A horizon has value of 4 or 5 dry, 2 or 3 moist, and chroma of 2 or 3. The Bt horizon has value of 4 through 6 dry, 3 through 5 moist, and chroma of 2 through 4. Texture typically is sandy clay loam but is loam in some pedons. It is 20 to 35 percent clay and 35 to 50 percent fine or coarser sand.

The C horizon has value of 5 through 7 dry, 4 through 6 moist, and chroma of 2 through 4. Texture commonly is fine sandy loam but is very fine sandy loam in some pedons. Reaction is slightly or moderately alkaline.

Haverdad Series

The Haverdad series consists of very deep, well drained soils on flood plains and stream terraces. The soils formed in alluvium derived from various sources. Slopes range from 0 to 4 percent. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine-loamy, mixed (calcareous), mesic Ustic Torrfluents.

Typical pedon of Haverdad loam in an area of Haverdad-Clarkelen complex, 0 to 3 percent slopes, 2,600 feet north and 750 feet east of the southwest corner of sec. 12, T. 38 N, R. 65 W.

Ap—0 to 4 inches; pale brown (10YR 6/3) loam, dark grayish brown (10YR 4/2) moist; weak medium platy structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; moderately alkaline; gradual smooth boundary.

AC—4 to 14 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak medium

subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common fine roots; slightly effervescent, calcium carbonate is disseminated; moderately alkaline; clear smooth boundary.

- C1—14 to 30 inches; pale brown (10YR 6/3) loam, stratified with lenses of sandy loam and clay loam, brown (10YR 4/3) moist; massive; thin stratifications; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; slightly effervescent, calcium carbonate is disseminated; strongly alkaline; gradual smooth boundary.
- C2—30 to 60 inches; very pale brown (10YR 7/3) clay loam, stratified with lenses of loam and silty clay loam, brown (10YR 5/3) moist; massive; thin stratifications; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; slightly effervescent, calcium carbonate is disseminated; strongly alkaline.

Hue is 10YR or 2.5Y throughout the soil. The soils are commonly effervescent throughout but are noneffervescent to a depth of 10 inches in some pedons. Content of rounded gravel ranges from 0 to 10 percent throughout the soil. Electrical conductivity is typically less than 4 millimhos per centimeter, but is 4 to 8 millimhos per centimeter in the C horizon of the saline phase. The weighted average clay content in the control section ranges from 20 to 35 percent.

The A horizon has value of 5 or 6 dry, 4 or 5 moist, and chroma of 2 through 4. Reaction is slightly or moderately alkaline.

The C horizon has value of 6 or 7 dry, 4 or 5 moist, and chroma of 2 through 4. Texture is dominantly loam, clay loam, or silty clay loam, but thin strata of sandy loam, fine sandy loam, or clay loam are common. Reaction is moderately or strongly alkaline.

Hiland Series

The Hiland series consists of very deep, well drained soils on alluvial fans, and footslopes of hills, plains, and terraces. The soils formed in alluvium and eolian deposits derived from sedimentary rocks. Slopes range from 0 to 15 percent. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine-loamy, mixed, mesic Ustollic Haplargids.

Typical pedon of Hiland sandy loam, 0 to 6 percent slopes, 2,450 feet south and 1,650 feet east of the northwest corner of sec. 19, T. 36 N., R. 62 W.

- Ap—0 to 4 inches; brown (10YR 5/3) sandy loam, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and very fine roots; neutral; abrupt smooth boundary.
- AB—4 to 9 inches; grayish brown (10YR 5/2) sandy loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common fine and very fine roots; neutral; clear wavy boundary.
- Bt1—9 to 14 inches; brown (10YR 5/3) sandy clay loam, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, nonsticky and nonplastic; common fine and very fine roots; few faint clay films on faces of peds; neutral; clear wavy boundary.
- Bt2—14 to 21 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 5/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and nonplastic; common fine and very fine roots; common faint clay films on faces of peds and lining pores; neutral; clear wavy boundary.
- Bt3—21 to 28 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 5/3) moist; moderate medium and fine subangular blocky structure; hard, friable, slightly sticky and nonplastic; common fine and very fine roots; few faint clay films lining pores; slightly alkaline; clear wavy boundary.
- Bk—28 to 40 inches; very pale brown (10YR 7/3) fine sandy loam, brown (10YR 5/3) moist; weak coarse angular blocky structure; hard, friable, nonsticky and nonplastic; few fine roots; strongly effervescent, calcium carbonate occurs as common fine filaments and soft masses; moderately alkaline; gradual wavy boundary.
- C—40 to 60 inches; light yellowish brown (10YR 6/4) sandy loam, yellowish brown (10YR 5/4) moist; massive; hard, friable, nonsticky and nonplastic; few fine roots; violently effervescent, calcium carbonate is disseminated; moderately alkaline.

Depth to horizons containing accumulations of calcium carbonate ranges from 15 to 28 inches. Content of coarse fragments is less than 5 percent throughout the soil.

The A horizon has value of 5 or 6 dry, 3 or 4 moist, and chroma of 2 or 3. Texture is sandy loam or fine sandy loam.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 or 6 dry, 4 or 5 moist, and chroma of 2 through 4. Texture is sandy clay loam or sandy loam, 18 to 35 percent clay, and 35 to 60 percent fine or coarser sand. Reaction is neutral or slightly alkaline.

The Bk and C horizons have hue of 10YR or 2.5Y, value of 5 through 7 dry, 4 through 6 moist, and chroma of 2 through 4. Texture is sandy loam, sandy clay loam, or fine sandy loam. Reaction is moderately or strongly alkaline. Calcium carbonate equivalent ranges from 5 to 12 percent in the Bk horizon and 1 to 5 percent in the C horizon.

Hilight Series

The Hilight series consists of shallow, well drained soils on hills. The soils formed in residuum derived from shale. Slopes range from 6 to 45 percent. Elevation is 3,800 to 4,600 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are clayey, montmorillonitic, nonacid, mesic, shallow Ustic Torriorthents.

Typical pedon of Hilight clay in an area of Hilight-Savageton clays, 6 to 15 percent slopes, 1,800 feet north and 2,200 feet west of the southeast corner of sec. 18, T. 38 N., R. 60 W.

A—0 to 2 inches; light brownish gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) moist; weak medium granular structure parting to moderate fine granular; hard, firm, sticky and plastic; common fine and very fine roots; neutral; clear wavy boundary.

C—2 to 19 inches; light brownish gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate thin and medium plate-like rock structure; hard, firm, sticky and plastic; common fine and very fine roots; 5 percent soft shale fragments; slightly acid; clear smooth boundary.

Cr—19 inches; weakly consolidated, platy, noneffervescent shale.

Hue is 2.5Y or 10YR, value of 5 or 6, and chroma of 2 or 3 throughout the profile. Depth to shale bedrock is 10 to 20 inches. The control section is 40 to 55 percent clay. Reaction is slightly acid through slightly alkaline.

The A horizon has a texture of clay or clay loam.

The C horizon has 5 to 15 percent medium and fine

plate-like soft shale fragments and 0 to 10 percent shale channery fragments.

Jayem Series

The Jayem series consists of very deep, well drained soils on alluvial fans, hills, and valley sideslopes. The soils formed in alluvium and eolian deposits derived from sandstone. Slopes range from 0 to 15 percent. Elevation is 4,800 to 5,500 feet. The average annual precipitation is 15 to 17 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are coarse-loamy, mixed, mesic Aridic Haplustolls.

Typical pedon of Jayem fine sandy loam in an area of Jayem-Julesburg fine sandy loams, 0 to 6 percent slopes, 2,300 feet north and 2,500 feet west of the southeast corner of sec. 20, T. 34 N., R. 62 W.

Ap—0 to 5 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak thin platy structure parting to weak fine angular blocky; soft, very friable, nonsticky and nonplastic; many fine and very fine, and common medium roots; neutral; clear smooth boundary.

AB—5 to 11 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium angular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and medium roots; neutral; abrupt smooth boundary.

Bw—11 to 25 inches; brown (10YR 5/3) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; slightly alkaline; clear smooth boundary.

C—25 to 60 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; slightly alkaline.

The soils are typically noneffervescent throughout, but a few fine masses of calcium carbonate are in the horizons below a depth of 40 inches in some pedons. Content of coarse fragments ranges from 0 to 10 percent.

The A horizon has value of 4 or 5 dry, 2 or 3 moist, and chroma of 2 or 3.

Reaction in the Bw and C horizons is neutral or slightly alkaline. The Bw horizon has value of 5 or 6 dry, 3 or 4 moist, and chroma of 2 or 3. The C horizon has value of 5 through 7 dry, 4 through 6 moist, and

chroma of 2 through 4. Texture is fine sandy loam, but is very fine sandy loam in some pedons.

Julesburg Series

The Julesburg series consists of very deep, well drained soils. These soils are on alluvial fans, footslopes of hills, terraces, and valley sideslopes. They formed in alluvium, residuum, and eolian deposits derived from sandstone. Slopes range from 0 to 15 percent. Elevation is 4,800 to 5,500 feet. The average annual precipitation is 15 to 17 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are coarse-loamy, mixed, mesic Aridic Argiustolls.

Typical pedon of Julesburg fine sandy loam in an area of Jayem-Julesburg fine sandy loams, 0 to 6 percent slopes, 2,500 feet south and 2,250 feet east of the northwest corner of sec. 14, T. 33 N., R. 65 W.

A—0 to 5 inches; brown (10YR 5/3) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium platy structure parting to weak medium and moderate fine granular; soft, friable, nonsticky and nonplastic; many fine and very fine and common medium roots; neutral; abrupt smooth boundary.

AB—5 to 16 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure parting to moderate fine granular; soft, very friable, nonsticky and nonplastic; many fine and very fine and common medium roots; neutral; abrupt wavy boundary.

Bt1—16 to 22 inches; yellowish brown (10YR 5/4) fine sandy loam, dark yellowish brown (10YR 3/4) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and nonplastic; common fine and very fine and few medium roots; many faint clay films on faces of peds and bridging sand grains; neutral; abrupt wavy boundary.

Bt2—22 to 26 inches; yellowish brown (10YR 5/4) fine sandy loam, dark yellowish brown (10YR 3/4) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, nonsticky and nonplastic; common fine and very fine and few medium roots; common faint clay films on faces of peds and bridging sand grains; neutral; clear wavy boundary.

C1—26 to 32 inches; pale brown (10YR 6/3) loamy fine sand, brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, friable, nonsticky and nonplastic; few fine roots; neutral; clear wavy boundary.

C2—32 to 60 inches; pale brown (10YR 6/3) loamy fine sand, brown (10YR 4/3) moist; massive; soft, friable, nonsticky and nonplastic; few fine roots; neutral.

The soils are noneffervescent throughout. Thickness of the mollic epipedon is 10 to 20 inches.

The A horizon has value of 4 or 5 dry, 2 or 3 moist, and chroma of 2 or 3. Texture is fine sandy loam or very fine sandy loam.

Reaction in the Bt and C horizons is neutral or slightly alkaline. The Bt horizon has value of 5 or 6 dry, 2 or 4 moist, and chroma of 2 through 4. Texture is fine sandy loam and 12 to 18 percent clay. The C horizon has chroma of 2 through 4. Texture is loamy fine sand, loamy sand, or fine sandy loam. Content of sandstone gravel in this horizon ranges from 0 to 10 percent.

Kadoka Series

The Kadoka series consists of moderately deep, well drained soils on outwash alluvial fans, terraces, and hills. The soils formed in alluvium and residuum derived from siltstone. Slopes range from 2 to 10 percent. Elevation is 3,800 to 4,800 feet. The average annual precipitation is 12 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine-silty, mixed, mesic Aridic Argiustolls.

Typical pedon of Kadoka silt loam in an area of Thirtynine-Kadoka silt loams, 2 to 10 percent slopes, 100 feet north and 700 feet west of the southeast corner of sec. 11, T. 34 N., R. 62 W.

A—0 to 3 inches; grayish brown (10YR 5/2) silt loam, dark brown (10YR 3/3) moist; weak medium granular structure; soft, very friable, slightly sticky and slightly plastic; many fine and very fine roots; slightly alkaline; abrupt smooth boundary.

AB—3 to 7 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; slightly alkaline; clear wavy boundary.

Bt—7 to 14 inches; light yellowish brown (10YR 6/4) silty clay loam, dark yellowish brown (10YR 4/4)

moist; moderate fine prismatic structure parting to strong fine subangular blocky; hard, friable, sticky and plastic; common medium and fine and very fine roots; common faint clay films on faces of pedis; moderately alkaline; clear wavy boundary.

Bk—14 to 32 inches; light brown (7.5YR 6/4) silt loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; strongly effervescent, calcium carbonate occurs as few fine filaments and soft masses; strongly alkaline; gradual irregular boundary.

Cr—32 inches; light gray to pinkish gray weakly consolidated siltstone.

Depth to siltstone bedrock ranges from 20 to 40 inches. Depth to horizons containing an accumulation of calcium carbonate ranges from 10 to 22 inches. Content of siltstone gravel is commonly less than 5 percent throughout the soil but the Bk horizon in some pedons may contain as much as 15 percent.

The A horizon has value of 4 or 5 dry, 3 moist, and chroma of 2 or 3. Reaction is neutral or slightly alkaline.

The Bt horizon has hue of 7.5YR or 10YR, value of 5 or 6 dry, 3 or 4 moist, and chroma of 3 or 4. Texture is silt loam or silty clay loam with 20 to 35 percent clay. Reaction is slightly or moderately alkaline.

The Bk horizon has hue of 7.5YR or 10YR, value of 6 or 7 dry, 4 or 5 moist, and chroma of 3 or 4. Reaction is moderately or strongly alkaline.

Keeline Series

The Keeline Series consists of very deep, well drained soils on alluvial fans, terraces, and footslopes and toeslopes of hills. The soils formed in alluvium and eolian deposits derived from various sources. Slopes range from 0 to 20 percent. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are coarse-loamy, mixed (calcareous), mesic Ustic Torriorthents.

Typical pedon of Keeline fine sandy loam in an area of Taluce-Turnercrest-Keeline fine sandy loams, 3 to 20 percent slopes, 1,250 feet north and 200 feet east of the southwest corner of sec. 1, T. 40 N., R. 65 W.

A—0 to 3 inches; light yellowish brown (10YR 6/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak very fine granular structure; soft,

very friable, nonsticky and nonplastic; common fine and very fine roots; slightly effervescent, calcium carbonate is disseminated; moderately alkaline; clear smooth boundary.

AC—3 to 14 inches; light yellowish brown (10YR 6/4) fine sandy loam, brown (10YR 4/3) moist; moderate fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few fine and very fine roots; slightly effervescent, calcium carbonate is disseminated; moderately alkaline; clear smooth boundary.

C1—14 to 22 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; medium plate-like rock structure parting to coarse subangular blocky; slightly hard, friable, nonsticky and nonplastic; few very fine roots; slightly effervescent, calcium carbonate is disseminated; moderately alkaline; clear smooth boundary.

C2—22 to 29 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine roots; strongly effervescent, calcium carbonate is disseminated; strongly alkaline; gradual smooth boundary.

C3—29 to 60 inches; light yellowish brown (10YR 6/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; strongly effervescent, calcium carbonate is disseminated; moderately alkaline.

Hue is 10YR or 2.5Y throughout the soil. Texture is sandy loam or fine sandy loam. These soils are typically effervescent throughout the profile but are noneffervescent to a depth of a few inches in some pedons. The control section is a fine sandy loam or sandy loam and 6 to 18 percent clay.

The A horizon has value of 5 or 6 dry, 4 or 5 moist, and chroma of 2 through 4. Reaction is neutral through moderately alkaline.

The C horizon has value of 6 or 7 dry, 5 or 6 moist, and chroma of 2 through 4. Reaction is moderately or strongly alkaline.

Keyner Series

The Keyner series consists of very deep, well drained soils on alluvial fans, terraces, and stream terraces. The soils formed in alluvium derived from various sources. Slope is 0 to 6 percent. Elevation is 3,800 to 4,200 feet. The average annual precipitation

is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average frost-free period is 110 to 130 days.

These soils are fine-loamy, mixed, mesic Haplustollic Natrargids.

Typical pedon of Keyner fine sandy loam in an area of Keyner-Slickspots complex, 0 to 6 percent slopes, 2,550 feet north and 2,100 feet east of the southwest corner of sec. 31, T. 38 N., R. 61 W.

E—0 to 5 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; moderate medium platy structure parting to weak fine granular; soft, very friable, nonsticky and nonplastic; many fine roots; neutral; abrupt wavy boundary.

Bt1—5 to 10 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; strong medium columnar structure parting to strong medium and fine angular blocky; very hard, firm, slightly sticky and slightly plastic; common fine roots; common distinct clay films on faces of peds; moderately alkaline; clear wavy boundary.

Bt2—10 to 15 inches; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) moist; moderate medium columnar structure parting to strong medium angular blocky; very hard, firm, slightly sticky and slightly plastic; common fine roots; many distinct clay films on faces of peds; moderately alkaline; clear wavy boundary.

2Btkny—15 to 24 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium and fine subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine roots; few faint clay films on faces of peds; strongly effervescent, calcium carbonate occurs as common soft masses; few crystals of gypsum and other salts; strongly alkaline; clear wavy boundary.

2Bky—24 to 42 inches; light gray (2.5Y 7/2) silty clay loam, grayish brown (2.5Y 5/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; strongly effervescent, calcium carbonate occurs as few fine filaments and masses; few gypsum crystals; strongly alkaline; gradual wavy boundary.

2C—42 to 60 inches; light gray (2.5Y 7/2) silt loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, friable, slightly sticky and nonplastic; few fine roots; strongly effervescent, calcium carbonate is disseminated; strongly alkaline.

Depth to the base of the natric horizon and to horizons containing accumulations of calcium

carbonate ranges from 11 to 26 inches. Clay content in the control section is 25 to 35 percent.

The E horizon has value of 6 or 7 dry, 4 or 5 moist, and chroma of 2 or 3. Reaction is neutral through moderately alkaline.

The Bt and Btkny horizons have hue of 2.5Y or 10YR, value of 5 or 6 dry, 4 or 5 moist, and chroma of 2 through 4. Texture of the Bt horizon is loam or clay loam. Reaction is moderately or strongly alkaline. Texture of the Btkny horizon is silty clay loam or clay loam. Reaction is strongly or very strongly alkaline.

The Bky and C horizons have hue of 2.5Y or 10YR, value of 6 or 7 dry, 4 or 5 moist, and chroma of 2 through 4. Texture of the Bky horizon is silty clay loam or clay loam. Texture of the C horizon is silt loam or very fine sandy loam. Reaction is strongly alkaline, except when buffered by the presence of gypsum, it is moderately alkaline. Electrical conductivity in these horizons ranges from 8 to 16 millimhos per centimeter.

Kishona Series

The Kishona series consists of very deep, well drained soils on alluvial fans, terraces, and hillslopes and in dissected drainageways. The soils formed in alluvium derived from various sources. Slopes range from 0 to 30 percent. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine-loamy, mixed (calcareous), mesic Ustic Torriorthents.

Typical pedon of Kishona loam in an area of Theedle-Kishona-Shingle loams, 3 to 20 percent slopes, 2,500 feet south and 2,500 feet east of the northwest corner of sec. 30, T. 40 N., R. 66 W.

A—0 to 4 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate medium and fine granular structure; soft, very friable, slightly sticky and nonplastic; common fine roots; slightly alkaline; clear smooth boundary.

Bk—4 to 24 inches; very pale brown (10YR 7/3) silty clay loam, brown (10YR 5/3) moist; weak medium and coarse angular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; strongly effervescent, calcium carbonate occurs as common fine masses; strongly alkaline; gradual smooth boundary.

C—24 to 60 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; massive; slightly hard, friable, slightly sticky and nonplastic; few very fine

roots; slightly effervescent, calcium carbonate is disseminated; strongly alkaline.

Hue is 2.5Y or 10YR throughout the soil. Depth to horizons containing calcium carbonate ranges from 0 to 4 inches. The control section is silty clay loam, clay loam, or loam. It is 20 to 35 percent clay, and 15 to 35 percent fine or coarser sand. Content of coarse fragments range from 0 to 15 percent throughout.

The A horizon has value of 5 or 6 dry, 3 through 5 moist, and chroma of 2 through 4. Texture is loam or clay loam. Reaction is slightly or moderately alkaline.

The Bk and C horizons have value of 5 through 7 dry, 4 or 5 moist, and chroma of 2 through 4. Reaction commonly moderately or strongly alkaline. Electrical conductivity in these horizons is commonly less than 4 millimhos per centimeter. However, in the C horizon of the sodic phase, reaction is very strongly alkaline and the electrical conductivity ranges from 2 to 8 millimhos per centimeter.

Lambman Series

The Lambman series consists of shallow, well drained soils on hills. The soils formed in residuum derived from sandstone. Slopes range from 1 to 8 percent. Elevation is 4,700 to 5,500 feet. The average annual precipitation is 15 to 17 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are loamy, mixed, mesic, shallow Aridic Argiustolls.

Typical pedon of Lambman loam in an area of Hargreave-Lambman association, 1 to 8 percent slopes, 2,200 feet north and 1,900 feet west of the southeast corner of sec. 2, T. 32 N., R. 63 W.

A—0 to 4 inches; brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; weak medium and moderate fine granular structure; soft, friable, slightly sticky and slightly plastic; many fine and very fine and few medium roots; neutral; clear smooth boundary.

Bt1—4 to 11 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate fine prismatic structure parting to strong fine angular blocky; hard, friable, sticky and plastic; common fine and very fine and few medium roots; many distinct and common prominent clay films on faces of peds; neutral; clear wavy boundary.

Bt2—11 to 17 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; moderate and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few medium, fine

and very fine roots; many faint and few distinct clay films on faces of peds; slightly alkaline; clear wavy boundary.

Cr—17 inches; weakly consolidated, fine grained, noneffervescent sandstone.

Depth to sandstone bedrock is 10 to 20 inches. The soils are typically noneffervescent throughout the profile, but some pedons may contain a few masses of calcium carbonate in the horizon immediately above the bedrock. Reaction is neutral or slightly alkaline.

The A horizon has value of 4 or 5 dry and chroma of 2 or 3.

The Bt horizon has value of 4 through 6 dry, 3 through 5 moist, and chroma of 2 through 4. Texture is loam or clay loam.

Las Animas Series

The Las Animas series consists of very deep, somewhat poorly drained soils on flood plains. The soils formed in alluvium derived from sedimentary rock. Slopes range from 0 to 2 percent. Elevation is 4,800 to 5,400 feet. The average annual precipitation is 15 to 17 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are coarse-loamy, mixed (calcareous), mesic Typic Fluvaquents.

Typical pedon of Las Animas fine sandy loam in an area of Las Animas fine sandy loam, 0 to 2 percent slopes, in Sioux County, Nebraska, 2,640 feet north and 1,000 feet east of the southwest corner of sec. 2, T. 28 N., R. 54 W.

A—0 to 8 inches; light brownish gray (2.5Y 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak fine granular structure; slightly hard, very friable, nonsticky and nonplastic; strongly effervescent, calcium carbonate is disseminated; moderately alkaline; clear smooth boundary.

ACg—8 to 12 inches; light brownish gray (2.5Y 6/2) very fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; strongly effervescent, calcium carbonate is disseminated; moderately alkaline; clear smooth boundary.

Cg—12 to 60 inches; light gray (2.5Y 7/2) very fine sandy loam stratified with 1 to 3 inch thick layers of loam and loamy very fine sand, grayish brown (2.5Y 5/2) moist; common fine distinct yellow (10YR 7/8) redox concentrations; massive; slightly

hard, very friable, slightly sticky and nonplastic; strongly effervescent, calcium carbonate is disseminated; moderately alkaline.

Hue is 2.5Y or 10YR throughout the soil. Depth to horizons containing calcium carbonate ranges from 0 to 10 inches. The control section averages 8 to 18 percent clay. Reaction is slightly through moderately alkaline.

The A horizon has value of 4 through 6 dry, 3 or 4 moist, and chroma of 0 through 2.

The Cg horizon has value of 3 through 7 dry, 5 or 6 moist, and chroma of 1 through 3. Texture is dominantly very fine sandy loam, fine sandy loam, or loamy very fine sand but strata of loam, fine sand, or loamy sand are commonly present.

Lohmiller Series

The Lohmiller series consists of very deep, well drained soils on flood plains and low terraces. The soils formed in alluvium derived from sedimentary rocks. Slopes range from 0 to 4 percent. Elevation is 3,600 to 4,600 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine, montmorillonitic (calcareous), mesic Ustic Torrifuvents.

Typical pedon of Lohmiller silty clay, 0 to 3 percent slopes, 850 feet south and 250 feet east of the northwest corner of sec. 22, T. 38 N., R. 63 W.

A—0 to 4 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; moderate fine platy structure; soft, friable, sticky and plastic; many fine roots; neutral; clear smooth boundary.

AC—4 to 9 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 4/3) moist; weak medium and fine platy structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; slightly effervescent, calcium carbonate is disseminated; slightly alkaline; clear smooth boundary.

C—9 to 60 inches; pale brown (10YR 6/3) clay loam, stratified with layers of loam and silty clay loam, brown (10YR 4/3) moist; moderate thin and medium bedding planes; hard, friable, sticky and plastic; common very fine roots; slightly effervescent, calcium carbonate is disseminated; moderately alkaline.

Hue is 10YR or 2.5Y throughout the soil. Depth to horizons containing calcium carbonate ranges from 0

to 10 inches. The control section averages 35 to 50 percent clay, and 5 to 15 percent fine or coarser sand. Content of coarse fragments ranges from 0 to 10 percent throughout the soil.

The A horizon has value of 5 or 6 dry, 4 or 5 moist, and chroma of 2 or 3. Texture is clay loam or silty clay. Reaction is neutral through moderately alkaline.

The C horizon has value of 5 through 7 dry, 4 through 6 moist, and chroma of 2 or 3. Texture dominantly is clay loam, but thin discontinuous strata of clay, silty clay, silty clay loam, or loam are commonly present. Reaction is slightly or moderately alkaline. Electrical conductivity of this horizon is commonly less than 4 millimhos per centimeter, but in the pedons of the saline phase, it ranges from 4 to 8 millimhos per centimeter.

Manter Series

The Manter series consists of very deep, well drained soils on alluvial fans, terraces, and footslopes of hills. The soils formed in alluvium and eolian deposits derived from sedimentary rock. Slopes range from 0 to 10 percent. Elevation is 4,000 to 5,500 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are coarse-loamy, mixed, mesic Aridic Argiustolls.

Typical pedon of Manter fine sandy loam in an area of Alice-Manter fine sandy loams, 0 to 6 percent slopes, 2,200 feet north and 1,700 feet west of the southeast corner of sec. 13, T. 34 N., R. 64 W.

A—0 to 9 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; weak medium platy structure parting to weak medium and fine granular; soft, very friable, nonsticky and nonplastic; many fine and very fine roots; neutral; abrupt smooth boundary.

Bt—9 to 18 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; soft, friable, nonsticky and nonplastic; common fine roots; common faint clay films on faces of peds and bridging sand grains; neutral; clear wavy boundary.

Bk—18 to 28 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, friable, nonsticky and nonplastic; slightly effervescent,

calcium carbonate occurs as few threads and filaments; slightly alkaline; clear wavy boundary.
 C—28 to 60 inches; light gray (10YR 7/2) fine sandy loam, grayish brown (10YR 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; slightly effervescent, calcium carbonate is disseminated; moderately alkaline.

Depth to horizons containing accumulations of calcium carbonate ranges from 11 to 34 inches. The mollic epipedon is 7 to 19 inches thick. Content of coarse fragments ranges from 0 to 5 percent throughout the soil.

The A horizon has value of 4 or 5 dry, 2 or 3 moist, and chroma of 2 or 3. Texture is fine sandy loam or sandy loam. Reaction is neutral.

Texture of the Bt, Bk, and C horizons commonly is fine sandy loam, but they are sandy loam in some pedons. The Bt horizon has value of 4 through 6 dry, 3 or 4 moist, and chroma of 2 through 4. Reaction is neutral or slightly alkaline. The Bk and C horizons have value of 6 or 7 dry, 4 or 5 moist, and chroma of 2 or 3. Reaction is slightly or moderately alkaline.

Manzanola Series

The Manzanola series consists of very deep, well drained soils on terraces and alluvial fans. The soils formed in alluvium derived from sedimentary rocks. Slopes range from 0 to 6 percent. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine, montmorillonitic, mesic Ustollic Haplargids.

Typical pedon of Manzanola silty clay loam, 6 to 15 percent slopes, in Fall River County, South Dakota, 1,100 feet south and 750 feet east of the northwest corner of sec. 1, T. 12 S., R. 4 E.

A—0 to 4 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; strong fine granular structure; slightly hard, very friable, sticky and plastic; common very fine roots; strongly effervescent, calcium carbonate is disseminated; slightly alkaline; clear wavy boundary.

BA—4 to 7 inches; grayish brown (2.5Y 5/2) silty clay loam, olive brown (2.5Y 4/3) moist; moderate medium subangular blocky structure; slightly hard, very friable, sticky and plastic; common very fine roots; strongly effervescent, calcium carbonate is disseminated; moderately alkaline; clear wavy boundary.

Bt—7 to 15 inches; light gray (2.5Y 7/2) silty clay loam, grayish brown (2.5Y 5/2) moist; weak medium prismatic structure parting to moderate fine subangular blocky; hard, firm, sticky and plastic; few very fine roots; many distinct clay films on faces of peds; strongly effervescent, calcium carbonate is disseminated; moderately alkaline; gradual wavy boundary.

Bky—15 to 25 inches; light gray (2.5Y 7/2) silty clay loam, grayish brown (2.5Y 5/2) moist; weak medium subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; strongly effervescent, calcium carbonate is disseminated; common fine crystals of gypsum; moderately alkaline; gradual wavy boundary.

Bky2—25 to 60 inches; light gray (2.5Y 7/2) silty clay loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, friable, sticky and plastic; strongly effervescent, calcium carbonate is disseminated; common fine crystals of gypsum; strongly alkaline.

The depth to horizons containing calcium carbonate is 0 to 8 inches.

The A horizon has value of 5 or 6 dry, 3 or 4 moist, and chroma of 2 or 3.

The Bt horizon value of 5 to 7 dry, 4 or 5 moist, and chroma of 2 to 4.

Reaction in the Bk horizon is moderately or strongly alkaline.

Midway Series

The Midway series consists of shallow, well drained soils on hills. The soils formed in residuum derived from shale. Slopes range from 6 to 25 percent. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are clayey, montmorillonitic (calcareous), mesic, shallow Ustic Torriorthents.

The typical pedon of Midway silty clay loam, in an area of Minnequa-Midway silty clay loams, 6 to 25 percent slopes, in Fall River County, South Dakota, 2,000 feet west and 580 feet south of the northeast corner of sec. 13, T. 12 S., R. 4 E.

A—0 to 4 inches; pale olive (5Y 6/3) silty clay loam, olive (5Y 4/3) moist; weak fine granular structure; hard, friable, sticky and plastic; common fine roots; strongly effervescent, calcium carbonate is disseminated; slightly alkaline; clear wavy boundary.

AC—4 to 8 inches; light yellowish brown (2.5Y 6/4) silty clay loam, olive (5Y 5/4) moist; weak medium

subangular blocky structure; hard, firm, sticky and plastic; few fine accumulations of carbonates; few fine roots; strongly effervescent, calcium carbonate is disseminated; moderately alkaline; clear wavy boundary.

C—8 to 16 inches; olive (5Y 5/3) silty clay loam, olive (5Y 4/3) moist; moderate thin and medium rock structure; hard, firm, sticky and plastic; few fine roots; common medium shale fragments; slightly effervescent, calcium carbonate is disseminated and occurs as few fine masses and filaments; moderately alkaline; gradual wavy boundary.

Cr—16 to 60 inches; pale yellow (5Y 7/3) shale, olive (5Y 5/3) moist; few faint reddish stains; very hard; slightly effervescent; moderately alkaline.

The A and C horizons have hue of 10YR to 5Y, value of 3 to 6 dry, 3 to 5 moist, and chroma of 2 to 3. Texture of the C horizon is silty clay loam or silty clay.

Minnequa Series

The Minnequa series consists of moderately deep, well drained soils on tablelands and hills. The soils formed in residuum derived from limestone. Slopes range from 2 to 25 percent. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine-silty, mixed (calcareous), mesic Ustic Torriorthents.

Typical pedon of Minnequa silty clay loam, in an area of Minnequa-Midway silty clay loams, 6 to 25 percent slopes, in Fall River County, South Dakota, 2,000 feet east and 1,700 feet north of the southwest corner of sec. 6, T. 7 S., R. 7 E.

A—0 to 4 inches; grayish brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to moderate medium granular; slightly hard, very friable, sticky and plastic; common fine roots; strongly effervescent, calcium carbonate is disseminated; slightly alkaline; clear smooth boundary.

AC—4 to 11 inches; light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to moderate fine subangular blocky; hard, very friable, sticky and plastic; common fine roots; violently effervescent, calcium carbonate is disseminated; slightly alkaline; clear smooth boundary.

C—11 to 24 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 5/3) moist; massive; hard, friable, sticky and plastic; common fine roots to 18 inches; violently effervescent, calcium carbonate is disseminated; moderately alkaline; abrupt smooth boundary.

Cr—24 to 60 inches; weakly consolidated light gray (10YR 7/1) limestone, grayish brown (10YR 5/2) moist; few fine roots in the upper part; slightly alkaline.

Depth to bedrock ranges from 20 to 40 inches. Hue is 5Y to 7.5YR throughout the soil.

The A horizon has value of 5 to 8 dry, 3 to 8 moist, and chroma of 1 to 4. Texture is silt loam and silty clay loam. Reaction is slightly or moderately alkaline.

Moskee Series

The Moskee series consists of very deep, well drained soils on alluvial fans, terraces, and footslopes and toeslopes of hills. The soils formed in eolian deposits and alluvium derived from sedimentary rock. Slopes range from 0 to 10 percent. Elevation is 4,000 to 5,500 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine-loamy, mixed, mesic Aridic Argiustolls.

Typical pedon of Moskee fine sandy loam in an area of Moskee-Manter fine sandy loams, 3 to 10 percent slopes, 1,300 feet south and 2,300 feet east of the northwest corner of sec. 21, T. 31 N., R. 65 W.

A1—0 to 5 inches; dark brown (10YR 3/3) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and medium roots; neutral; clear smooth boundary.

A2—5 to 10 inches; dark brown (10YR 3/3) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many fine and medium roots; slightly alkaline; clear smooth boundary.

Bt1—10 to 22 inches; brown (10YR 5/3) sandy clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; common faint clay films on faces of peds and as bridges between sand grains; slightly alkaline; clear smooth boundary.

Bt2—22 to 31 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 4/3) moist; moderate

medium subangular blocky structure; slightly hard, friable, sticky and slightly plastic; few fine roots; few faint clay films on faces of peds; slightly alkaline; clear smooth boundary.

Btk—31 to 34 inches; grayish brown (10YR 5/2) sandy loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; few fine roots; few faint clay films on faces of peds and as bridges between sand grains; strongly effervescent, calcium carbonate as few thin filaments and threads; moderately alkaline; clear smooth boundary.

Bk—34 to 60 inches; light brownish gray (10YR 6/2) sandy loam, grayish brown (10YR 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots to 42 inches; strongly effervescent, calcium carbonate is disseminated; moderately alkaline.

The mollic epipedon is 7 to 20 inches thick. Content of coarse fragments ranges from 0 to 15 percent throughout the soil.

The A and Bt horizons have neutral or slightly alkaline reaction. The A horizon has hue of 10YR or 2.5Y, value of 3 through 5 dry, 2 or 3 moist, and chroma of 2 through 4 dry, 2 or 3 moist. Texture is sandy loam or fine sandy loam, and 10 to 20 percent clay. The Bt horizon has hue of 7.5YR through 2.5Y, value of 4 through 6 dry, 3 or 5 moist, and chroma of 2 through 4. Texture is loam or sandy clay loam.

The Bk horizon has hue of 10YR or 2.5Y, value of 5 through 7 dry, 4 through 6 moist, and chroma of 2 through 4. Reaction is moderately or strongly alkaline. Calcium carbonate equivalent ranges from 4 to 15 percent.

Noden Series

The Noden series consists of very deep, well drained soils on alluvial fans and terraces. The soils formed in alluvium and eolian deposits derived from sandstone. Slopes range from 0 to 6 percent. Elevation is 4,800 to 5,500 feet. The average annual precipitation is 15 to 17 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine-loamy, mixed, mesic Aridic Argiustolls.

Typical pedon of Noden fine sandy loams, 0 to 3 percent slopes, 200 feet south and 2,500 feet west of the northeast corner of sec. 12, T. 33 N., R. 63 W.

Ap—0 to 7 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium and fine granular structure; soft, friable, nonsticky and nonplastic; few medium and common fine roots; neutral; clear smooth boundary.

Bt1—7 to 15 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, sticky and plastic; few medium, fine, and very fine roots; many faint and common distinct clay films on faces of peds; neutral; clear wavy boundary.

Bt2—15 to 25 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; moderate medium prismatic structure parting to strong medium and fine angular blocky; hard, friable, sticky and plastic; few medium, fine, and very fine roots; many distinct and common prominent clay films on faces of peds; neutral; clear wavy boundary.

Bt3—25 to 32 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak medium prismatic structure parting to moderate medium and fine subangular blocky; slightly hard, friable, sticky and slightly plastic; few medium, fine, and very fine roots; many faint clay films on faces of peds; neutral; clear wavy boundary.

BC—32 to 41 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; weak coarse and medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; neutral; gradual wavy boundary.

C—41 to 60 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; massive; soft, friable, nonsticky and nonplastic; neutral.

The soils are typically noneffervescent throughout the profile, but a few masses of calcium carbonate may be present below a depth of 40 inches in some pedons. Content of angular gravel ranges from 0 to 5 percent throughout the soil.

The A horizon has value of 4 or 5 dry, 2 or 3 moist, and chroma of 2 or 3.

Reaction in the Bt and C horizons is neutral or slightly alkaline. The Bt horizon has value of 4 through 6 dry, 3 or 4 moist, and chroma of 2 or 3. Texture is sandy clay loam, loam, or clay loam, 20 to 35 percent clay, and 15 to 35 percent fine or coarser sand. The C horizon has hue of 10YR or 2.5Y, value of 6 or 7 dry, 4 or 5 moist, and chroma of 2 or 3.

Orella Series

The Orella series consists of shallow, well drained soils on dissected plains. The soils formed in residuum derived from sodic shale. Slopes range from 3 to 25 percent. Elevation is 3,800 to 4,500 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are clayey, mixed (calcareous), mesic, shallow Ustic Torriorthents.

Typical pedon of Orella silty clay loam in an area of Orella-Cadoma-Rock outcrop complex, 3 to 25 percent slopes, 2,300 feet north and 1,650 feet east of the southwest corner of sec. 20, T. 38 N., R. 62 W.

A—0 to 3 inches; light yellowish brown (2.5Y 6/4) silty clay loam, olive brown (2.5Y 4/4) moist; moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; few medium and fine roots; moderately alkaline; clear smooth boundary.

AC—3 to 7 inches; light yellowish brown (2.5Y 6/4) silty clay loam, olive brown (2.5Y 4/4) moist; weak fine subangular blocky structure; hard, firm, sticky and plastic; common fine and very fine roots; strongly effervescent, calcium carbonate is disseminated; strongly alkaline; clear wavy boundary.

C—7 to 14 inches; light yellowish brown (2.5Y 6/4) clay, olive brown (2.5Y 4/4) moist; weak medium and thick plate-like shale rock structure; hard, firm, sticky and plastic; few medium and fine roots; strongly effervescent, calcium carbonate is disseminated; strongly alkaline; clear wavy boundary.

Cr—14 inches; weakly consolidated sodic shale.

Hue is 10YR or 2.5Y, value is 6 or 7 dry, 4 or 5 moist, and chroma of 2 through 4 throughout the soil. Depth to shale bedrock is 10 to 20 inches. Texture of the control section is silty clay loam, silty clay, or clay and 35 to 50 percent clay. Content of channery fragments ranges from 0 to 5 percent.

The C horizon has electrical conductivity 2 to 8 millimhos per centimeter. The exchangeable sodium in this horizon is estimated to range from 15 to 30 percent. Content of soft fine shale plate-like fragments in the C horizon ranges from 10 to 70 percent. Reaction is strongly or very strongly alkaline.

Orpha Series

The Orpha series consists of very deep, excessively drained soils on valley sideslopes, footslopes of hills, and dunes. The soils formed in eolian deposits derived from various sources. Slopes range from 0 to 15 percent. Elevation is 3,600 to 5,400 feet. The average annual precipitation is 10 to 17 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are mixed, mesic Ustic Torripsammments.

Typical pedon of Orpha fine sand in an area of Orpha-Dwyer-Taluca complex, 6 to 15 percent slopes, 1,300 feet south and 1,300 feet east of the northwest corner of sec. 7, T. 37 N, R. 64 W.

A—0 to 3 inches; brown (10YR 5/3) fine sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky and nonplastic; many medium, fine, and very fine roots; slightly alkaline; abrupt wavy boundary.

C1—3 to 26 inches; yellowish brown (10YR 5/4) fine sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; many fine and medium roots; slightly alkaline; clear wavy boundary.

C2—26 to 60 inches; pale brown (10YR 6/3) fine sand, brown (10YR 5/3) moist; single grain; loose, nonsticky and nonplastic; slightly alkaline.

Hue is 10YR or 2.5Y throughout the soil. Depth to horizons containing calcium carbonate is more than 40 inches. Reaction is neutral or slightly alkaline.

The A horizon has value of 5 or 6 dry, 4 or 5 moist, and chroma of 2 or 3. Texture is fine sand, loamy sand, or loamy fine sand.

The C horizon has value of 6 or 7 dry, 5 or 6 moist, and chroma of 2 through 4. Texture is sand, fine sand, loamy fine sand, or loamy sand.

Paiges Series

The Paiges series consists of moderately deep, well drained soils on pediments. The soils formed in alluvium derived from acidic shale. Slopes range from 3 to 10 percent. Elevation is 3,800 to 4,500 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine, montmorillonitic, mesic Entic Haplumbrepts.

Typical pedon of Paiges clay loam, 3 to 10 percent slopes, 1,280 feet north and 1,100 feet west of the southeast corner of sec. 8, T. 38 N., R. 61 W.

- A1—0 to 5 inches; grayish brown (10YR 5/2) clay loam, black (10YR 2/1) moist; weak medium and fine granular structure; soft, slightly hard, slightly sticky and plastic; many medium and fine and common coarse roots; 30 percent soft fine and very fine shale platelets; extremely acid; clear smooth boundary.
- A2—5 to 16 inches; grayish brown (2.5Y 5/2) clay loam, very dark gray (2.5Y 3/1) moist; weak medium and fine granular structure; soft, friable, slightly sticky and plastic; many medium and fine and common coarse roots; 50 percent soft fine and very fine shale platelets; extremely acid; clear wavy boundary.
- AC—16 to 28 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure parting to weak fine platy; slightly hard, friable, sticky and plastic; few coarse and common medium and fine roots; 60 percent soft fine and very fine shale platelets; extremely acid; clear smooth boundary.
- C—28 to 39 inches; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) moist; weak thin and medium plate-like shale rock structure; slightly hard, friable, sticky and plastic; few coarse, medium and fine roots; 70 percent soft fine and very fine shale platelets; extremely acid; abrupt smooth boundary.
- Cr—39 inches; very pale brown to brownish yellow acidic shale.

Hue is 10YR or 2.5Y throughout the soil. Depth to shale bedrock ranges from 20 to 40 inches. The umbric epipedon is 10 to 16 inches thick. The base saturation of the umbric epipedon is 30 to 50 percent. The base saturation decreases with increasing depth throughout the control section. Content of channery fragments in the control section averages 0 to 15 percent. Content of fine and very fine plate-like soft shale fragments ranges from 20 to 50 percent in the A horizon, 50 to 70 percent in the AC horizon, and 60 to 80 percent in the C horizon.

The A horizon has value of 4 or 5 dry, 2 or 3 moist, and chroma of 1 or 2. Reaction is very strongly or extremely acid.

The C horizon has value of 5 or 6 dry, 4 or 5 moist, and chroma of 2 or 3. Texture is clay loam or clay, and 35 to 55 percent clay.

Petrie Series

The Petrie series consists of very deep, well drained soils on alluvial fans and terraces. The soils formed in alluvium derived from various sources. Slopes range from 0 to 3 percent. Elevation is 3,600 to 4,800 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine, montmorillonitic (calcareous), mesic Ustertic Torriorthents.

Typical pedon of Petrie silty clay, in an area of Bahl-Petrie complex, 0 to 3 percent slopes, 1,850 feet south and 1,900 feet east of the northwest corner of sec. 3, T. 35 N., R. 61 W.

- A—0 to 3 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate medium and fine granular structure; slightly hard, firm, very sticky and very plastic; common fine and few medium roots; slightly effervescent, calcium carbonate is disseminated; very strongly alkaline; abrupt wavy boundary.
- AC—3 to 10 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak coarse columnar structure parting to weak medium and coarse subangular blocky; extremely hard, very firm, very sticky and very plastic; common fine and few medium roots; strongly effervescent, calcium carbonate occurs as few fine specks; few fine specks of gypsum; strongly alkaline; abrupt wavy boundary.
- C1—10 to 38 inches; light gray (2.5Y 7/2) silty clay, light yellowish brown (2.5Y 6/4) moist; very coarse angular blocky; very hard, very firm, very sticky and very plastic; few medium and fine roots; strongly effervescent, calcium carbonate is disseminated; common medium and fine specks and crystals of gypsum; strongly alkaline; clear wavy boundary.
- C2—38 to 60 inches; light gray (2.5Y 7/2) silty clay, light brownish gray (2.5Y 6/2) moist; massive; very hard, very firm, very sticky and very plastic; few fine roots; strongly effervescent, calcium carbonate is disseminated; strongly alkaline.

Hue is 10YR or 2.5Y throughout the soil. These soils are typically effervescent throughout. Exchangeable sodium ranges from 15 to 30 percent throughout the soil. Content of coarse fragments ranges from 0 to 5 percent throughout. Cracks 1 to 3 centimeters wide are present from the surface to a

depth of 30 to 50 inches for a period of 6 to 8 months. Reaction is strongly or very strongly alkaline throughout the soil.

The A horizon has value of 6 or 7 dry, 4 or 5 moist, and chroma of 2 through 4.

The C horizon has value of 6 or 7 dry, 5 or 6 moist, and chroma of 2 through 4. Texture commonly is silty clay or clay, but it is a clay loam in some pedons. It is 35 to 55 percent clay. Few to common crystals and soft masses of gypsum and calcium carbonate are present in the upper part of this horizon and are inherited from the parent material. Electrical conductivity ranges from 4 to 8 millimhos per centimeter.

Phiferson Series

The Phiferson series consists of moderately deep, well drained soils on valley sideslopes, alluvial fans, hills, and terraces. The soils formed in residuum derived from sandstone. Slopes range from 0 to 25 percent. Elevation is 4,800 to 5,600 feet. The average annual precipitation is 12 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are coarse-loamy, mixed, mesic Aridic Haplustolls.

Typical pedon of Phiferson fine sandy loam in an area of Jayem-Phiferson-Trelona fine sandy loams, 3 to 10 percent slopes, 2,000 feet south and 2,300 feet west of the northeast corner of sec. 36, T. 34 N., R. 63 W.

- A—0 to 4 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common fine roots; slightly alkaline; clear smooth boundary.
- AC—4 to 11 inches; brown (10YR 5/3) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine roots; slightly alkaline; abrupt smooth boundary.
- C—11 to 25 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; 10 percent angular sandstone gravel; strongly effervescent, calcium carbonate is disseminated; slightly alkaline; abrupt wavy boundary.
- Cr—25 inches; weakly consolidated, effervescent sandstone.

Depth to sandstone bedrock is 20 to 40 inches. Depth to horizons containing calcium carbonate is 11 to 32 inches. The control section is dominantly fine sandy loam, but a thin layer of loamy very fine sand or very fine sandy loam is present in some pedons. The control section ranges from 6 to 16 percent clay. Content of angular sandstone gravel ranges from 0 to 15 percent throughout the soil. Some pedons have a Bw and/or a Bk horizon.

The A, AC, and Bw horizons have a neutral or slightly alkaline reaction. The A horizon has value of 4 or 5 dry, 2 or 3 moist, and chroma of 2 or 3. The AC and Bw horizons have value of 5 or 6 dry, 3 or 4 moist, and chroma of 2 through 4. Texture is fine sandy loam or loamy very fine sand.

The Bk and C horizons have value of 6 or 7 dry, 4 or 5 moist, and chroma of 2 or 3. Reaction is slightly or moderately alkaline. Calcium carbonate equivalent in these horizons ranges from 5 to 12 percent.

The Phiferson soil in map unit 174 is outside the characteristics of the Phiferson series because the control section has a texture of very fine sandy loam with 15 to 35 percent fine and coarser sand. This difference, however, does not significantly affect the use and management of the soil.

The Phiferson soil in map units 112 and 173 is outside of the characteristics of the Phiferson series because it is noneffervescent throughout the profile and has a texture of loamy very fine sand or very fine sandy loam with 15 to 35 percent fine or coarser sand in the control section. These differences, however, do not significantly affect the use and management of the soil.

Pierre Series

The Pierre series consists of moderately deep, well drained soils on hills. The soils formed in residuum derived from shale. Slopes range from 3 to 30 percent. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine, montmorillonitic, mesic Typic Torrerts.

Typical pedon of Pierre silty clay, 6 to 15 percent slopes, in Sioux County, Nebraska, 1,400 feet south and 1,500 feet west of the northeast corner of sec. 33, T. 35 N., R. 53 W.

- A—0 to 3 inches; olive (5Y 5/3) silty clay, olive (5Y 4/3) moist; weak fine subangular blocky structure;

very hard, very firm, sticky and plastic; slightly effervescent; moderately alkaline; clear smooth boundary.

Bw—3 to 20 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; strong medium subangular blocky structure; very hard, very firm, sticky and plastic; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk1—20 to 29 inches; light brownish gray (2.5Y 6/2) clay, grayish brown (2.5Y 5/2) moist; weak medium subangular blocky structure; very hard, very firm, very sticky and very plastic; strongly effervescent, common fine masses and threads of calcium carbonate; moderately alkaline; clear smooth boundary.

Bk2—29 to 32 inches; light brownish gray (2.5Y 6/2) clay, grayish brown (2.5Y 5/2) moist; common fine distinct stains of yellow (2.5Y 7/8) in soft shale fragments; 25 percent soft shale fragments; massive; very hard, very firm, sticky and plastic; slightly effervescent, common fine masses and threads of calcium carbonate; moderately alkaline; gradual wavy boundary.

Cr—32 inches; light brownish gray (2.5Y 6/2) weakly consolidated clay shale, grayish brown (2.5Y 5/2) moist; common medium distinct stains of olive yellow (2.5Y 6/8); slightly alkaline.

Hue is 2.5Y or 5Y throughout the soil. Depth to the paralithic contact ranges from 20 to 40 inches. Depth to horizons containing calcium carbonate is 0 to 6 inches. When dry, these soils are characterized by cracks, which are 1/2 inch to 2 inches wide and several feet long and extend through the subsoil. The control section averages 50 to 60 percent clay. A thin C horizon occurs immediately above the bedrock in some pedons.

The A horizon has value of 4 to 6 dry, 3 to 5 moist, and chroma of 1 to 3. Texture is clay or silty clay. Reaction is slightly or moderately alkaline.

The Bw, Bk, and C horizons have value of 5 or 6 dry, 4 or 5 moist, and chroma of 1 to 3.

Ponderosa Series

The Ponderosa series consists of very deep, well drained soils on ridges and hillslopes. The soils formed in colluvium derived from sandstone. Slopes range from 9 to 60 percent. Elevation is 4,500 to 5,000 feet. The average annual precipitation is 15 to 17 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are coarse-loamy, mixed, mesic Torriorthentic Haplustolls.

Typical pedon of Ponderosa loamy very fine sand in an area of Tassel-Ponderosa-Rock outcrop association, 9 to 70 percent slopes, in Sioux County, Nebraska, 1,900 feet south and 1,350 feet east of the northwest corner of sec. 12, T. 30 N., R. 53 W.

A1—0 to 8 inches; grayish brown (10YR 5/2) loamy very fine sand, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; neutral; clear smooth boundary.

A2—8 to 13 inches; grayish brown (10YR 5/2) loamy very fine sand, dark brown (10YR 3/3) moist; weak medium granular structure; soft, very friable, nonsticky and nonplastic; slightly alkaline; clear wavy boundary.

AC—13 to 22 inches; light brownish gray (10YR 6/2) loamy very fine sand, brown (10YR 4/3) moist; weak coarse prismatic structure; soft, very friable, nonsticky and nonplastic; slightly alkaline; clear wavy boundary.

C1—22 to 45 inches; light brownish gray (10YR 6/2) loamy very fine sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; strongly effervescent, calcium carbonate is disseminated; moderately alkaline; clear wavy boundary.

C2—45 to 60 inches; very pale brown (10YR 7/3) loamy very fine sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few sandstone gravel; strongly effervescent, calcium carbonate is disseminated; moderately alkaline.

Depth to horizons containing calcium carbonate commonly ranges from 15 to 40 inches but is more than 60 inches in some pedons. The control section is 5 to 18 percent clay. Content of coarse fragments is less than 15 percent throughout the soil.

The A horizon has value of 4 or 5 dry, 2 or 3 moist, and chroma of 1 through 3. Reaction is neutral or slightly alkaline.

The C horizon has value of 5 through 7 dry, 4 through 6 moist, and chroma of 2 through 4. Texture is loamy very fine sand or very fine sandy loam. Reaction is slightly or moderately alkaline.

Recluse Series

The Recluse series consists of very deep, well drained soils on alluvial fans, tablelands, and

toeslopes, footslopes, and shoulder slopes of hills. The soils formed in alluvium and eolian deposits derived from various sources. Slopes range from 0 to 10 percent. Elevation is 4,000 to 5,500 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine-loamy, mixed, mesic Aridic Argiustolls.

Typical pedon of Recluse loam in an area of Albinas-Recluse loams, 0 to 6 percent slopes, 100 feet north and 2,000 feet west of the southeast corner of sec. 32, T. 31 N., R. 66 W.

Ap—0 to 7 inches; brown (10YR 4/3) loam, very dark grayish brown (10YR 3/2) moist; weak medium and fine granular structure; soft, very friable, slightly sticky and slightly plastic; many fine and medium roots; neutral; abrupt smooth boundary.

Bt1—7 to 16 inches; brown (10YR 4/3) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; many fine and medium roots; many distinct clay films on faces of peds; neutral; gradual smooth boundary.

Bt2—16 to 24 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; strong medium and fine subangular blocky structure; slightly hard, friable, sticky and plastic; common fine and medium roots; many distinct and common prominent clay films on faces of peds; neutral; abrupt smooth boundary.

Btk—24 to 27 inches; brown (10YR 5/3) loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few medium and coarse roots; many faint and few distinct clay films on faces of peds; slightly effervescent, calcium carbonate occurs as few fine filaments; slightly alkaline; clear smooth boundary.

Bk—27 to 37 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; strongly effervescent, calcium carbonate occurs as common fine filaments and threads; moderately alkaline; abrupt smooth boundary.

C—37 to 60 inches; light gray (10YR 7/2) loam, pale brown (10YR 6/3) moist; massive; soft, very friable, slightly sticky and slightly plastic; strongly effervescent, calcium carbonate is disseminated; moderately alkaline.

Hue is 10YR or 2.5Y throughout the soil. The mollic epipedon is 7 to 20 inches thick. Depth to horizons containing accumulations of calcium carbonate ranges from 14 to 34 inches. Content of sandstone gravel ranges from 0 to 10 percent throughout the soil.

Reaction is neutral or slightly alkaline in the A and Bt horizons. The A horizon has value of 4 or 5 dry, 2 or 3 moist, and chroma of 2 or 3. The Bt horizon has value of 4 through 6 dry, 3 or 4 moist, and chroma of 2 through 4. Texture of the Bt horizon is clay loam or loam, 20 to 35 percent clay, and 15 to 35 percent fine or coarser sand.

The Bk and C horizons have value of 5 through 7 dry, 4 or 5 moist, and chroma of 2 through 4. Texture is loam or very fine sandy loam.

Rhoame Series

The Rhoame series consists of very deep, well drained soils on alluvial fans, fan aprons, and footslopes of hills. The soils formed in alluvium derived from shale. Slopes range from 0 to 6 percent. Elevation is 3,800 to 4,800 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine, montmorillonitic, nonacid, mesic Ustic Torriorthents.

Typical pedon of Rhoame clay in an area of Rhoame-Bahl clays, 0 to 6 percent slopes, 600 feet north and 2,600 feet west of the southeast corner of sec. 32, T. 37 N., R. 61 W.

A—0 to 3 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; very hard, very firm, very sticky and very plastic; common fine and very fine roots; neutral; clear wavy boundary.

AC—3 to 10 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; very hard, very firm, very sticky and very plastic; common fine and very fine roots; slightly alkaline; clear wavy boundary.

C1—10 to 35 inches; light brownish gray (2.5Y 6/2) clay, grayish brown (2.5Y 5/2) moist; massive; very hard, very firm, very sticky and very plastic; few fine roots; common fine and very fine filaments of gypsum; neutral; clear wavy boundary.

C2—35 to 60 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; massive;

hard, friable, very sticky and very plastic; few fine roots; neutral.

Hue is 2.5Y or 10YR throughout the soil. Content of channery fragments ranges from 0 to 15 percent throughout the soil. The control section is 40 to 60 percent clay.

The A horizon has value of 5 or 6 dry, 3 or 4 moist, and chroma of 1 through 3. Reaction is slightly acid through slightly alkaline.

The C horizon has value of 5 or 6 dry, 4 or 5 moist, and chroma of 1 through 3. A few fine filaments and masses of gypsum and calcium carbonate occur in the upper part of this horizon in many pedons and are inherited from the parent material. Reaction is slightly acid or neutral.

Samday Series

The Samday series consists of shallow, well drained soils on hills and ridges. The soils formed in residuum derived from shale. Slopes range from 3 to 30 percent. Elevation is 3,600 to 4,800 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are clayey, montmorillonitic (calcareous), mesic, shallow Ustic Torriorthents.

Typical pedon of Samday clay in an area of Shingle-Rock outcrop-Samday complex, 10 to 30 percent slopes, 2,050 feet north and 450 feet west of the southeast corner sec. 18, T. 40 N., R. 66 W.

A—0 to 3 inches; light brownish gray (10YR 6/2) clay, dark grayish brown (10YR 4/2) moist; moderate fine granular structure; soft, friable, very sticky and very plastic; common fine and few medium roots; slightly effervescent, calcium carbonate is disseminated; moderately alkaline; clear smooth boundary.

C—3 to 14 inches; light gray (10YR 7/2) clay, grayish brown (10YR 5/2) moist; moderate thin and medium plate-like shale rock structure; slightly hard, friable, very sticky and very plastic; common fine roots; slightly effervescent, calcium carbonate is disseminated; moderately alkaline; clear wavy boundary.

Cr—14 inches; weakly consolidated shale.

Hue is 10YR or 2.5Y throughout the soil. Depth to shale bedrock is 10 to 20 inches.

The A horizon has value of 5 through 7 dry, 4 or 5 moist, and chroma of 2 through 4. Reaction is slightly or moderately alkaline.

The C horizon has value of 5 through 7 dry, 4 or 5 moist, and chroma of 2 through 4. Texture is clay or clay loam, and 35 to 50 percent clay. Content of soft plate-like shale fragments in this horizon ranges from 0 to 35 percent. Reaction is slightly through strongly alkaline. Electrical conductivity ranges from 0 to 4 millimhos per centimeter.

Savageton Series

The Savageton series consists of moderately deep, well drained soils on hills and ridges. The soils formed in residuum and alluvium derived from shale. Slopes range from 3 to 15 percent. Elevation is 3,600 to 4,800 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine, montmorillonitic, mesic Ustollic Camborthids.

Typical pedon of Savageton clay in an area of Hilight-Savageton clays, 6 to 15 percent slopes, 2,600 feet south and 2,000 feet west of the northeast corner of sec. 3, T. 36 N., R. 61 W.

A—0 to 4 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate fine subangular blocky structure; slightly hard, firm, sticky and plastic; common fine and very fine roots; neutral; clear wavy boundary.

Bw—4 to 14 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak medium and moderate fine subangular blocky structure; hard, firm, sticky and plastic; common fine and very fine roots; slightly effervescent, calcium carbonate is disseminated; slightly alkaline; clear wavy boundary.

Bk—14 to 28 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard, very firm, very sticky and very plastic; few fine and very fine roots; slightly effervescent, calcium carbonate occurs as few fine filaments; slightly alkaline; clear wavy boundary.

Cr—28 inches; weakly consolidated, grayish brown platy shale.

Hue is 2.5Y or 10YR throughout the soil. Depth to shale bedrock ranges from 20 to 40 inches. Depth to horizons containing carbonate ranges from 10 to 20 inches. Content of channery fragments ranges from 0 to 10 percent throughout the soil.

The A horizon has value of 5 or 6 dry, 4 or 5 moist, and chroma of 2 or 3. Reaction is neutral through moderately alkaline.

The Bw and Bk horizons have texture of clay or silty clay, and 40 to 60 percent clay. The Bw horizon has value of 5 or 6 dry, 4 or 5 moist, and chroma of 2 through 4. The Bk horizon has value of 5 through 7 dry, 4 through 6 moist, and chroma of 2 through 4. Reaction is slightly through strongly alkaline.

Schamber Series

The Chamber series consists of very deep, excessively drained soils on terrace escarpments. The soils formed in very gravelly outwash alluvium derived from various sources. Slopes range from 3 to 30 percent. Elevation is 3,800 to 4,800 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are sandy-skeletal, mixed, mesic Ustic Torriorthents.

Typical pedon of Chamber gravelly loamy sand in an area of Chamber-Tulloch complex, 3 to 30 percent slopes, 1,950 feet north and 200 feet east of the southwest corner of sec. 8, T. 38 N., R. 62 W.

A—0 to 2 inches; light olive brown (2.5Y 5/4) gravelly loamy sand, olive brown (2.5Y 4/4) moist; single grain; loose, nonsticky and nonplastic; 30 percent rounded gravel; slightly effervescent, calcium carbonate is disseminated; slightly alkaline; clear irregular boundary.

C1—2 to 15 inches; brownish yellow (10YR 6/6) very gravelly sand, yellowish brown (10YR 5/6) moist; single grain; loose, nonsticky and nonplastic; 35 percent rounded gravel; slightly effervescent, calcium carbonate is disseminated; slightly alkaline; clear irregular boundary.

C2—15 to 34 inches; pale yellow (2.5Y 7/4) very gravelly sand, light yellowish brown (2.5Y 6/4) moist; single grain; loose, nonsticky and nonplastic; 35 percent rounded gravel; strongly effervescent, calcium carbonate is disseminated; slightly alkaline; clear irregular boundary.

C3—34 to 60 inches; pale yellow (2.5Y 7/4) very gravelly sand, light yellowish brown (2.5Y 6/4) moist; single grain; loose, nonsticky and nonplastic; 45 percent rounded gravel; strongly effervescent, calcium carbonate is disseminated; moderately alkaline.

Hue is 2.5Y or 10YR throughout the soil. The soil is typically effervescent to the surface but may be noneffervescent to a depth of a few inches in some pedons.

The A horizon has value of 5 or 6 dry, 3 or 4 moist, and chroma of 2 through 4.

The C horizon has value of 6 or 7 dry, 5 or 6 moist, and chroma of 2 through 4. Texture of the fine earth in this horizon is loamy sand or sand. This horizon contains 35 to 60 percent rounded gravel and 0 to 20 percent cobbles. Reaction is slightly or moderately alkaline.

Senlar Series

The Senlar series consists of very deep, well drained soils on alluvial fans and terraces. The soils formed in alluvium derived from siltstone. Slopes range from 0 to 3 percent. Elevation is 4,200 to 4,800 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine-silty, mixed, mesic Ustollic Camborthids.

Typical pedon of Senlar silt loam, 0 to 3 percent slopes, 1,160 feet north and 700 feet west of the southeast corner of sec. 33, T. 36 N., R. 62 W.

A—0 to 2 inches; light gray (10YR 7/2) silt loam, brown (10YR 5/3) moist; weak fine granular structure; a thin vesicular crust occurs on soil surface; soft, friable, slightly sticky and slightly plastic; many fine and few medium roots; slightly effervescent, calcium carbonate disseminated; neutral; clear smooth boundary.

Bw1—2 to 8 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; weak medium prismatic structure parting to weak medium angular blocky; slightly hard, friable, slightly sticky and slightly plastic; common fine and few medium roots; strongly effervescent, calcium carbonate is disseminated; slightly alkaline; clear wavy boundary.

Bw2—8 to 16 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; weak medium prismatic structure parting to weak medium angular blocky; slightly hard, friable, slightly sticky and slightly plastic; common fine and few medium roots; strongly effervescent, calcium carbonate is disseminated; strongly alkaline; clear wavy boundary.

Bk1—16 to 22 inches; light gray (10YR 7/2) silt loam, pale brown (10YR 6/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and few medium roots; violent effervescence,

calcium carbonate is disseminated and occurs as few medium and fine filaments and threads; strongly alkaline; gradual wavy boundary.

Bk2—22 to 28 inches; light gray (10YR 7/2) silt loam, brown (10YR 5/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium roots; violently effervescent, calcium carbonate is disseminated and occurs as common fine filaments and specks; strongly alkaline; gradual wavy boundary.

2Bk3—28 to 60 inches; very pale brown (10YR 7/3) very fine sandy loam containing thin strata of fine sandy loam and silt loam, brown (10YR 5/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few medium and fine roots; violently effervescent, calcium carbonate is disseminated and occurs as few fine soft masses; strongly alkaline.

Hue is 10YR or 2.5Y throughout the soil.

The A and Bw horizons have value of 6 or 7 dry, 4 or 5 moist, and chroma of 2 or 3. Reaction is neutral or slightly alkaline in the A horizon. Texture of the Bw horizon is silt loam or silty clay loam. Reaction is slightly through strongly alkaline.

The Bk horizon has value of 6 or 7 dry, 5 or 6 moist, and chroma of 2 through 4. Texture is dominantly silt loam, but is very fine sandy loam in the lower part in some pedons. Reaction is moderately or strongly alkaline.

Shingle Series

The Shingle Series consists of shallow, well drained soils on ridges and hillslopes. The soils formed in residuum derived from shale. Slopes range from 3 to 45 percent. Elevation is 3,600 to 4,800 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are loamy, mixed (calcareous), mesic, shallow Ustic Torriorthents.

Typical pedon of Shingle loam in an area of Theedle-Kishona-Shingle loams, 3 to 20 percent slopes, 500 feet south and 1,000 feet west of the northeast corner of sec. 18, T. 39 N., R. 65 W.

A—0 to 8 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; weak medium subangular blocky structure parting to moderate medium granular; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; strongly effervescent, calcium carbonate is disseminated; moderately alkaline; clear smooth boundary.

C—8 to 12 inches; very pale brown (10YR 7/3) loam, pale brown (10YR 6/3) moist; massive; slightly hard, firm, slightly sticky and slightly plastic; strongly effervescent, calcium carbonate is disseminated; moderately alkaline; clear wavy boundary.

Cr—12 inches; weakly consolidated, effervescent shale.

Depth to shale bedrock is 10 to 20 inches. The soils are typically effervescent throughout the profile, but are noneffervescent to a depth of a few inches in some pedons. The control section is loam or clay loam, 20 to 35 percent clay, and 15 to 35 percent fine or coarser sand. Some pedons have 10 to 20 percent channery fragments on the surface.

The A horizon has value of 5 or 6 dry, 4 or 5 moist, and chroma of 2 or 3. Reaction is slightly or moderately alkaline.

The C horizon has value of 6 or 7 dry, 4 or 5 moist, and chroma of 2 or 3. Reaction is moderately or strongly alkaline. Content of soft shale fragments ranges from 0 to 25 percent.

Silhouette Series

The Silhouette series consists of very deep, well drained soils on alluvial fans. The soils formed in alluvium derived from shale. Slopes range from 0 to 6 percent. Elevation is 3,800 to 4,500 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine, montmorillonitic, mesic Ustollic Camborthids.

Typical pedon of Silhouette silt loam, 0 to 6 percent slopes, 850 feet north and 50 feet west of the southeast corner of sec. 13, T. 36 N., R. 62 W.

A—0 to 2 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; weak fine platy structure; soft, friable, slightly sticky and slightly plastic; many fine and very fine roots; strongly effervescent, calcium carbonate is disseminated; moderately alkaline; clear smooth boundary.

AB—2 to 7 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium fine platy structure; slightly hard, friable, sticky and slightly plastic; common fine roots; violently effervescent, calcium carbonate is disseminated; moderately alkaline; clear wavy boundary.

- Bw—7 to 15 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure parting to moderate fine angular blocky; slightly hard, friable, sticky and plastic; violently effervescent, calcium carbonate is disseminated; moderately alkaline; clear wavy boundary.
- Bky1—15 to 24 inches; light gray (10YR 7/2) silty clay loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; hard, friable, sticky and plastic; violently effervescent, calcium carbonate occurs as few fine filaments and threads; few gypsum crystals; strongly alkaline; clear wavy boundary.
- Bky2—24 to 34 inches; very pale brown (10YR 7/3) silty clay loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; hard, friable, sticky and plastic; violently effervescent, calcium carbonate occurs as common fine and few medium filaments and threads; few gypsum crystals; strongly alkaline; clear wavy boundary.
- C—34 to 60 inches; light gray (10YR 7/2) silty clay, pale brown (10YR 6/3) moist; massive; very hard, firm, sticky and plastic; violently effervescent, calcium carbonate is disseminated; moderately alkaline.

Hue is 2.5Y or 10YR throughout the soil. Depth to secondary accumulations of calcium carbonate ranges from 12 to 26 inches. The control section is silty clay loam or silty clay and 35 to 50 percent clay.

The A and Bw horizons have value of 5 or 6 dry, 4 or 5 moist, and chroma of 2 through 4. Reaction in the Bw horizon is slightly or moderately alkaline.

The Bk and C horizons have value of 5 through 7 dry, 4 through 6 moist, and chroma of 2 or 3. Reaction is moderately or strongly alkaline.

Skilak Series

The Skilak series consists of very deep, well drained soils on alluvial fans and terraces. The soils formed in alluvium derived from various sources. Slopes range from 0 to 6 percent. Elevation is 3,800 to 4,600 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine-silty, mixed (calcareous), mesic Ustic Torriorthents.

Typical pedon of Skilak silty clay in an area of Skilak-Kishona complex, 0 to 6 percent slopes, 300

feet south and 200 feet west of the northeast corner of sec. 24, T. 38 N., R. 63 W.

- A—0 to 3 inches; light yellowish brown (2.5Y 6/4) silty clay, olive brown (2.5Y 4/4) moist; weak medium platy structure; hard, firm, sticky and plastic; thin vesicular crust on soil surface; many fine and common medium roots; slightly effervescent, calcium carbonate is disseminated; moderately alkaline; abrupt smooth boundary.
- Bw—3 to 7 inches; light yellowish brown (2.5Y 6/4) silty clay loam, olive brown (2.5Y 4/4) moist; moderate fine subangular blocky structure; hard, firm, sticky and plastic; common medium and fine roots; strongly effervescent, calcium carbonate is disseminated; moderately alkaline; clear smooth boundary.
- C1—7 to 16 inches; pale yellow (2.5Y 7/4) silt loam, light olive brown (2.5Y 5/4) moist; weak thick plate-like rock structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and few medium roots; strongly effervescent, calcium carbonate is disseminated; moderately alkaline; clear wavy boundary.
- C2—16 to 60 inches; pale yellow (2.5Y 7/4) silt loam containing thin strata of very fine sandy loam, light olive brown (2.5Y 5/4) moist; weak moderately thick plate-like rock structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; strongly effervescent, calcium carbonate is disseminated; strongly alkaline.

Hue is 10YR or 2.5Y throughout the soil. The soil is typically effervescent throughout the profile but is noneffervescent to a depth of a few inches in some pedons. The control section is silt loam or silty clay loam with thin lenses of very fine sandy loam, loam, or silt. The control section averages 18 to 35 percent clay. Content of coarse fragments is less than 5 percent throughout the soil.

The A horizon has value of 6 or 7 dry, 4 or 5 moist, and chroma of 2 through 4. Reaction is slightly or moderately alkaline.

The Bw and C horizons have value of 6 or 7 dry, 4 or 5 moist, and chroma of 3 or 4. Reaction is moderately or strongly alkaline. Electrical conductivity ranges from 2 to 4 millimhos per centimeter.

Sunup Series

The Sunup series consists of shallow, somewhat excessively drained soils on ridges and hillslopes. The soils formed in residuum derived from sandstone.

Slopes range from 5 to 40 percent. Elevation is 4,000 to 4,800 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free season is 110 to 130 days.

These soils are loamy-skeletal, mixed (calcareous), mesic Lithic Ustic Torriorthents.

Typical pedon of Sunup channery loam in an area of Threetop-Sunup complex, 3 to 15 percent slopes, 1,700 feet north and 100 feet east of the southwest corner of sec. 18, T. 35 N., R. 61 W.

- A—0 to 2 inches; light brownish gray (10YR 6/2) channery loam, dark grayish brown (10YR 4/2) moist; moderate fine granular structure; soft, friable, slightly sticky and slightly plastic; many fine and very fine and few medium roots; 30 percent angular sandstone channery fragments; slightly effervescent, calcium carbonate is disseminated; slightly alkaline; abrupt smooth boundary.
- C—2 to 10 inches; pale brown (10YR 6/3) very channery loam, brown (10YR 4/3) moist; massive; soft, friable, nonsticky and nonplastic; common fine and very fine and few medium roots; 50 percent angular sandstone channery fragments; strongly effervescent, calcium carbonate is disseminated and occurs as thin coatings on the bottoms of channery fragments; strongly alkaline; abrupt smooth boundary.
- R—10 inches; hard, slightly effervescent, fine grained sandstone.

Hue is 7.5YR or 10YR throughout the soil. Depth to sandstone bedrock is 10 to 20 inches. The soil is effervescent throughout the profile. The texture of the fine earth in the control section is loam or sandy clay loam. The control section is 18 to 28 percent clay, and 15 to 35 percent fine or coarser sand. It is 35 to 60 percent channery fragments and 0 to 20 percent cobbles.

The A horizon has value of 5 or 6 dry, 3 or 4 moist, and chroma of 2 or 3. Texture is loam or fine sandy loam.

The C horizon has value of 5 through 7 dry, 4 or 5 moist, and chroma of 2 through 4. Reaction is moderately or strongly alkaline.

The Sunup soil in map unit 172 is a taxadjunct to the Sunup series because it is noneffervescent throughout the profile and is neutral or slightly alkaline in the C horizon. This soil is a loamy-skeletal, mixed, mesic, nonacid Lithic Ustic Torriorthent. This difference, however, does not significantly affect the use and management of the soil.

Taluze Series

The Taluze series consists of shallow, well drained soils on valley sideslopes, ridges, and hills. The soils formed in residuum derived from sandstone. Slopes range from 3 to 50 percent. Elevation is 3,600 to 5,800 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are loamy, mixed (calcareous) mesic, shallow Ustic Torriorthents.

Typical pedon of Taluze fine sandy loam in an area of Taluze-Rock outcrop-Shingle complex, 6 to 45 percent slopes, 2,150 feet north and 2,250 feet west of the southeast corner of sec. 30, T. 40 N., R. 66 W.

- A—0 to 5 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; moderate fine and very fine granular structure; soft, very friable, nonsticky and nonplastic; many fine roots; slightly effervescent, calcium carbonate is disseminated; moderately alkaline; clear smooth boundary.
- C—5 to 16 inches; light gray (10YR 7/2) fine sandy loam, brown (10YR 5/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; few fine roots; strongly effervescent, calcium carbonate is disseminated; moderately alkaline; clear wavy boundary.
- Cr—16 inches; weakly consolidated, effervescent sandstone.

Hue is 10YR or 2.5Y throughout the soil. Depth to sandstone bedrock ranges from 10 to 20 inches. These soils are typically effervescent throughout the profile, but are noneffervescent to a depth of a few inches in some pedons. Content of angular sandstone gravel ranges from 0 to 15 percent throughout the soil.

The A horizon has value of 4 through 6 dry, 4 or 5 moist, and chroma of 2 through 4. Reaction is slightly or moderately alkaline.

The C horizon has value of 5 through 7 dry, 4 or 5 moist, and chroma of 2 through 4. Texture is fine sandy loam or sandy loam, and 10 to 18 percent clay. Reaction is moderately or strongly alkaline.

Tassel Series

The Tassel Series consists of shallow, somewhat excessively drained soils on ridges, hillslopes, and valley sideslopes. The soils formed in residuum

derived from sandstone. Slopes range from 3 to 70 percent. Elevation is 4,800 to 5,400 feet. The average annual precipitation is 15 to 17 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are loamy, mixed (calcareous), mesic, shallow Ustic Torriorthents.

Typical pedon of Tassel loamy fine sand, in an area of Phiferson-Tassel-Rock outcrop complex, 6 to 30 percent slopes, 1,350 feet south and 900 feet east of the northwest corner of sec. 5, T. 32 N., R. 60 W.

- A—0 to 2 inches; light brownish gray (10YR 6/2) loamy fine sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky and nonplastic; many fine and very fine roots; slightly effervescent, calcium carbonate is disseminated; slightly alkaline; abrupt smooth boundary.
- C1—2 to 8 inches; pale brown (10YR 6/3) loamy very fine sand, brown (10YR 4/3) moist; massive parting to single grain; soft, friable, nonsticky and nonplastic; many fine and very fine roots; strongly effervescent, calcium carbonate is disseminated; moderately alkaline; abrupt wavy boundary.
- C2—8 to 12 inches; pale brown (10YR 6/3) loamy very fine sand, brown (10YR 4/3) moist; medium and coarse block-like sandstone rock structure; slightly hard, friable, nonsticky and nonplastic; few fine and very fine roots; 10 percent angular sandstone gravel; strongly effervescent, calcium carbonate is disseminated; moderately alkaline; clear wavy boundary.
- Cr—12 inches; weakly consolidated, effervescent sandstone.

Depth to bedrock ranges from 10 to 20 inches. The soils are typically effervescent throughout the profile but are noneffervescent to a depth of 3 inches in some pedons. Content of angular sandstone gravel ranges from 0 to 15 percent throughout the soil. Reaction is slightly or moderately alkaline throughout the soil.

The A horizon has value of 5 or 6 dry, 3 or 4 moist, and chroma of 2 or 3. Texture is loamy fine sand or fine sandy loam.

The C horizon has value of 6 through 8 dry, 4 or 5 moist, and chroma of 2 or 3. Texture is loamy very fine sand or fine sandy loam, and 5 to 10 percent clay.

The Tassel soils in map units 182 and 199 are a taxadjunct to the Tassel series because they have texture of loamy fine sand throughout the profile. These soils are mixed, mesic, shallow Ustic Torripsamments. This difference, however, does not significantly affect the use and management of the soil.

Terro Series

The Terro series consists of moderately deep, well drained soils on alluvial fans, terraces, hillslopes, and ridges. The soils formed in residuum and eolian deposits derived from sandstone. Slopes range from 0 to 20 percent. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are coarse-loamy, mixed, mesic Ustollic Haplargids.

Typical pedon of Terro sandy loam in an area of Terro-Vonalee sandy loams, 0 to 6 percent slopes, 800 feet south and 2,100 feet east of the northwest corner of sec. 9, T. 40 N., R. 66 W.

- A—0 to 3 inches; brown (10YR 5/3) sandy loam, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common fine and very fine roots; neutral; abrupt smooth boundary.
- Bt1—3 to 16 inches; brown (10YR 5/3) sandy loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; common fine and very fine roots; few faint clay films on faces of ped and bridging sand grains; neutral; abrupt smooth boundary.
- Bt2—16 to 22 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; few fine and very fine roots; few faint clay films on faces of ped and bridging sand grains; slightly alkaline; clear smooth boundary.
- Bk—22 to 36 inches; very pale brown (10YR 7/3) fine sandy loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; few fine and very fine roots; slightly effervescent, calcium carbonate occurs as few fine filaments and specks; strongly alkaline; abrupt wavy boundary.
- Cr—36 inches; weakly consolidated, effervescent sandstone.

Depth to sandstone bedrock is 20 to 40 inches. Depth to horizons containing accumulations of calcium carbonate ranges from 10 to 22 inches. Content of sandstone channery fragments ranges from 0 to 10 percent throughout the soil.

Reaction in the A and Bt horizons is neutral or slightly alkaline. Texture is fine sandy loam or sandy loam. The A horizon has value of 5 or 6 dry, 3 or 4

moist, and chroma of 2 or 3. The Bt horizon has value of 5 or 6 dry, 4 or 5 moist, and chroma of 2 or 3. It is 10 to 18 percent clay.

The Bk horizon has value of 6 or 7 dry, 4 through 6 moist, and chroma of 2 or 3. Reaction is slightly through strongly alkaline.

Theedle Series

The Theedle series consists of moderately deep, well drained soils on terraces, alluvial fans, ridges, and hillslopes, and in dissected drainageways. The soils formed in residuum and alluvium derived from various sources. Slopes range from 0 to 30 percent. Elevation is 3,600 to 4,800 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine-loamy, mixed (calcareous), mesic Ustic Torriorthents.

Typical pedon of Theedle loam in an area of Theedle-Kishona-Shingle loams, 3 to 20 percent slopes, 400 feet south and 1,700 feet east of the northwest corner of sec. 2, T. 36 N., R. 65 W.

A—0 to 3 inches; brown (10YR 5/3) loam, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and very fine roots; slightly alkaline; abrupt smooth boundary.

AC—3 to 6 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and very fine roots; slightly alkaline; abrupt smooth boundary.

C1—6 to 24 inches; pale brown (10YR 6/3) loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; strongly effervescent, calcium carbonate is disseminated; slightly alkaline; abrupt smooth boundary.

C2—24 to 32 inches; light gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; strongly effervescent, calcium carbonate is disseminated; moderately alkaline; gradual wavy boundary.

Cr—32 inches; interbedded, weakly consolidated, effervescent sandstone and shale.

Depth to bedrock ranges from 20 to 40 inches. The soils are commonly effervescent only in the C horizon but may be effervescent throughout the profile.

Content of sandstone and shale channery fragments ranges from 0 to 10 percent throughout the soil.

The A horizon has value of 5 or 6 dry, 4 or 5 moist, and chroma of 2 or 3. Reaction is neutral through moderately alkaline.

The C horizon has hue of 10YR or 2.5Y, value of 6 or 7 dry, 5 or 6 moist, and chroma of 2 through 4. Texture is loam or clay loam, 20 to 35 percent clay, and 15 to 35 percent fine or coarser sand. Reaction is slightly through strongly alkaline.

Thirtynine Series

The Thirtynine series consists of very deep, well drained soils on outwash alluvial fans, hills, and terraces. The soils formed in alluvium derived from siltstone. Slopes range from 0 to 6 percent. Elevation is 3,800 to 4,800 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine-silty, mixed, mesic Aridic Argiustolls.

Typical pedon of Thirtynine silt loam, 0 to 6 percent slopes, 200 feet south and 1,100 feet west of the northeast corner of sec. 2, T. 35 N., R. 62 W.

A1—0 to 3 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure parting to weak very fine granular; soft, very friable, slightly sticky and slightly plastic; common fine and very fine roots; neutral; clear smooth boundary.

A2—3 to 8 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common fine and very fine roots; slightly alkaline; clear wavy boundary.

Bt—8 to 15 inches; grayish brown (10YR 5/2) silty clay loam, dark grayish brown (10YR 4/2) moist; moderate medium prismatic structure; hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; many faint and few distinct clay films on faces of peds; slightly alkaline; clear wavy boundary.

Btk—15 to 24 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 4/3) moist; moderate medium prismatic structure; hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; few faint and distinct clay films on faces of peds; slightly effervescent, calcium carbonate is

disseminated; slightly alkaline; clear wavy boundary.

Bk—24 to 38 inches; very pale brown (10YR 7/3) silty clay loam, brown (10YR 5/3) moist; weak medium prismatic structure; hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; strongly effervescent, calcium carbonate is disseminated and occurs as few to common fine filaments and nests; moderately alkaline; clear wavy boundary.

C—38 to 60 inches; very pale brown (10YR 8/3) silt loam, pale brown (10YR 6/3) moist; massive; soft, very friable, slightly sticky and slightly plastic; few very fine roots; violently effervescent, calcium carbonate is disseminated; moderately alkaline.

The mollic epipedon is 7 to 12 inches thick. Depth to horizons containing accumulations of calcium carbonate ranges from 10 to 26 inches. Content of coarse fragments ranges from 0 to 15 percent throughout the soil.

The A horizon has value of 4 or 5 dry, 2 or 3 moist, and chroma of 2 or 3. Reaction is neutral or slightly alkaline.

The Bt and Bk horizons have texture of silt loam or silty clay loam. The Bt horizon has value of 5 through 7 dry, 3 through 5 moist, and chroma of 2 through 4. It is 18 to 35 percent clay. Reaction is slightly or moderately alkaline. The Bk and C horizons have hue of 7.5YR or 10YR, value of 7 or 8 dry, 5 or 6 moist, and chroma of 3 or 4. Texture of the C horizon is silt or silt loam. Reaction is moderately or strongly alkaline in the Bk and C horizons.

Threetop Series

The Threetop series consists of moderately deep, well drained soils on ridges and hillslopes. The soils formed in residuum derived from sandstone. Slopes range from 3 to 12 percent. Elevation is 4,000 to 4,800 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine-loamy, mixed, mesic Ustollic Haplargids.

Typical pedon of Threetop loam in an area of Threetop-Sunup complex, 3 to 15 percent slopes, 1,500 feet north and 400 feet east of the southwest corner of sec. 1, T. 34 N., R. 64 W.

A—0 to 3 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak medium and moderate fine granular structure; soft, very friable, slightly

sticky and slightly plastic; many fine and very fine and few medium roots; slightly acid; abrupt smooth boundary.

Bt1—3 to 7 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable, sticky and plastic; common fine and very fine and few medium roots; many distinct and common prominent clay films on faces of peds; neutral; abrupt wavy boundary.

Bt2—7 to 11 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and plastic; common fine and very fine and few medium roots; many faint and few distinct clay films on faces of peds; neutral; abrupt wavy boundary.

Bk—11 to 28 inches; very pale brown (10YR 7/3) loam, brown (10YR 5/3) moist; weak medium and fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; few fine and very fine roots; violently effervescent, calcium carbonate occurs as few fine seams, filaments, and soft masses; strongly alkaline; abrupt smooth boundary.

R—28 inches; hard, effervescent sandstone.

Depth to bedrock is 20 to 40 inches. Depth to horizons containing accumulations of calcium carbonate ranges from 11 to 16 inches.

The A horizon has value of 4 or 5 dry, 3 or 4 moist, and chroma of 2 through 4. Reaction is neutral or slightly acid.

The Bt horizon has hue of 7.5YR or 10YR, value of 5 or 6 dry, 4 or 5 moist, and chroma of 3 or 4. Texture is loam, sandy clay loam, or clay loam. This horizon is 25 to 35 percent clay and 35 to 50 percent fine or coarser sand. Content of angular sandstone gravel ranges from 0 to 15 percent. Reaction is neutral or slightly alkaline.

The Bk horizon has value of 6 or 7 dry, 4 or 5 moist, and chroma of 3 or 4. Texture is sandy loam, loam, or fine sandy loam. This horizon is 5 to 15 percent angular gravel. Calcium carbonate equivalent ranges from 15 to 25 percent. Reaction is moderately or strongly alkaline.

Torrington Series

The Torrington series consists of moderately deep, well drained soils on terraces. The soils formed in residuum derived from sandstone. Slopes range from

0 to 6 percent. Elevation is 4,900 to 5,500 feet. The average annual precipitation is 15 to 17 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are coarse-loamy, mixed, mesic Aridic Argiustolls.

Typical pedon of Torrington very fine sandy loam, in an area of Torrington-Julesburg very fine sandy loams, 0 to 6 percent slopes, 600 feet north and 2,100 feet west of the southeast corner of sec. 6, T. 32 N., R. 60 W.

A—0 to 5 inches; brown (10YR 4/3) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine and very fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and very fine and few medium roots; neutral; clear irregular boundary.

Bt1—5 to 12 inches; brown (10YR 5/3) very fine sandy loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, nonsticky and slightly plastic; common fine and very fine and few medium roots; common faint clay films bridging sand grains and lining pores; neutral; clear wavy boundary.

Bt2—12 to 19 inches; brown (10YR 5/3) very fine sandy loam, brown (10YR 4/3) moist; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable, nonsticky and slightly plastic; common fine and very fine and few medium roots; common faint clay films bridging sand grains and lining pores; slightly alkaline; clear wavy boundary.

C—19 to 29 inches; pale brown (10YR 6/3) loamy very fine sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few medium and fine roots; slightly alkaline; abrupt smooth boundary.

Cr—29 inches; weakly consolidated, noneffervescent sandstone.

Depth to bedrock ranges from 20 to 40 inches. The soils are typically noneffervescent throughout the profile but contain a few fine masses of calcium carbonate in the horizon immediately above the bedrock in some pedons. The mollic epipedon ranges from 7 to 15 inches thick.

The A horizon has value of 4 or 5 dry, 2 or 3 moist, and chroma of 2 or 3.

The Bt horizon has value of 5 or 6 dry, 3 or 4 moist, and chroma of 2 or 3. Texture is very fine sandy loam or fine sandy loam, and 10 to 18 percent clay. Reaction is neutral or slightly alkaline.

The C horizon has value of 6 or 7 dry, 4 or 5 moist, and chroma of 2 or 3. Texture is loamy very fine sand, fine sandy loam, or very fine sandy loam.

Trelona Series

The Trelona series consists of shallow, somewhat excessively drained soils on ridges, valley sideslopes, tablelands, and hillslopes. The soils formed in residuum derived from sandstone. Slopes range from 3 to 30 percent. Elevation is 4,600 to 5,600 feet. The average annual precipitation is 15 to 17 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are loamy, mixed, mesic, shallow Torriorthentic Haplustolls.

Typical pedon of Trelona fine sandy loam in an area of Jayem-Phiferson-Trelona fine sandy loams, 3 to 10 percent slopes, 200 feet south and 100 feet east of the northwest corner of sec. 16, T. 33 N., R. 62 W.

A—0 to 5 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium and moderate fine granular structure; soft, friable, nonsticky and nonplastic; common fine and many very fine roots; neutral; abrupt smooth boundary.

AC—5 to 10 inches; brown (10YR 5/3) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak coarse subangular blocky structure parting to weak fine granular; soft, friable, nonsticky and nonplastic; common fine and very fine roots; neutral; clear smooth boundary.

C—10 to 19 inches; pale brown (10YR 6/3) loamy very fine sand, brown (10YR 4/3) moist; massive; soft, friable, nonsticky and nonplastic; common fine and very fine roots; neutral; clear smooth boundary.

Cr—19 inches; weakly consolidated, noneffervescent sandstone.

Depth to sandstone is 10 to 20 inches. The mollic epipedon is 7 to 12 inches thick. The control section is fine sandy loam or loamy very fine sand and 6 to 15 percent clay. The soils are typically noneffervescent throughout the profile but contain a few masses of calcium carbonate in the horizon immediately above the bedrock in some pedons. Content of angular gravel ranges from 0 to 15 percent throughout the soil. Reaction is neutral or slightly alkaline.

The A horizon has chroma of 2 or 3.

The C horizon has value of 5 or 6 dry and chroma of 2 or 3.

Tullock Series

The Tullock series consists of moderately deep, excessively drained soils on ridges and terrace escarpments. The soils formed in residuum and eolian deposits derived from sandstone. Slopes range from 3 to 45 percent. Elevation is 3,800 to 4,800 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are mixed, mesic Ustic Torripsamments.

Typical pedon of Tullock loamy fine sand in an area of Taluce-Tullock-Rock outcrop complex, 3 to 45 percent slopes, 700 feet south and 1,600 feet east of the northwest of sec. 24, T. 39 N., R. 64 W.

A—0 to 4 inches; light olive brown (2.5Y 5/4) loamy fine sand, olive brown (2.5Y 4/4) moist; weak medium granular structure; soft, very friable, nonsticky and nonplastic; many medium and fine roots; slightly effervescent, calcium carbonate is disseminated; moderately alkaline; clear wavy boundary.

AC—4 to 9 inches; light olive brown (2.5Y 5/4) loamy fine sand, olive brown (2.5Y 4/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common medium and fine roots; slightly effervescent, calcium carbonate is disseminated; moderately alkaline; clear smooth boundary.

C1—9 to 24 inches; light yellowish brown (2.5Y 6/4) loamy fine sand, olive brown (2.5Y 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; few medium and fine roots; slightly effervescent, calcium carbonate is disseminated; moderately alkaline; clear smooth boundary.

C2—24 to 30 inches; olive yellow (2.5Y 6/6) loamy sand, olive brown (2.5Y 4/4) moist; moderate medium plate-like sandstone rock structure; slightly hard, friable, nonsticky and nonplastic; few medium and fine roots; slightly effervescent, calcium carbonate is disseminated; moderately alkaline; gradual wavy boundary.

2Cr—30 inches; weakly consolidated, lenticular sandstone.

Hue is 10YR or 2.5Y throughout the soil. Depth to bedrock ranges from 20 to 40 inches. The soils are typically effervescent throughout the profile but are noneffervescent to a depth of a few inches in some

pedons. Content of angular sandstone gravel ranges from 0 to 10 percent throughout the soil.

The A horizon has value of 5 or 6 dry, 4 or 5 moist, and chroma of 2 through 4. Reaction is slightly or moderately alkaline.

The C horizon has value of 5 through 7 dry, 4 through 6 moist, and chroma of 3 through 6. Texture is loamy fine sand or loamy sand. Reaction is moderately or strongly alkaline.

Turnercrest Series

The Turnercrest series consists of moderately deep, well drained soils on hills and ridges. The soils formed in residuum derived from sandstone. Slopes range from 2 to 30 percent. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are coarse-loamy, mixed (calcareous), mesic Ustic Torriorthents.

Typical pedon of Turnercrest fine sandy loam, in an area of Taluce-Turnercrest-Keeline fine sandy loams, 3 to 20 percent slopes, 2,100 feet north and 1,600 feet west of the southeast corner of sec. 30, T. 40 N., R. 66 W.

A—0 to 4 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many fine roots; slightly alkaline; clear smooth boundary.

AC—4 to 14 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; weak medium and fine subangular blocky structure parting to weak fine granular; soft, very friable, nonsticky and nonplastic; common fine roots; slightly effervescent, calcium carbonate is disseminated; moderately alkaline; gradual smooth boundary.

C—14 to 35 inches; light gray (10YR 7/2) fine sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; slightly effervescent, calcium carbonate is disseminated; moderately alkaline; abrupt wavy boundary.

Cr—35 inches; weakly consolidated, effervescent sandstone.

Hue is 10YR or 2.5Y throughout the soil. The soils are commonly effervescent throughout the profile, but are noneffervescent to a depth of 4 inches in some pedons. Depth to bedrock ranges

from 20 to 40 inches. Reaction is slightly or moderately alkaline throughout the soil.

The A horizon has value of 5 or 6 dry, 3 or 4 moist, and chroma of 2 or 3.

The C horizon has value of 5 through 7 dry, 4 or 5 moist, and chroma of 2 through 4. Texture is dominantly fine sandy loam with 7 to 16 percent clay, but a thin layer of loamy fine sand is present in the lower part in some pedons. Content of angular gravel in this horizon ranges from 0 to 15 percent and commonly increases with depth.

Ulm Series

The Ulm series consists of very deep, well drained soils on alluvial fans. The soils formed in alluvium derived from sedimentary rock. Slopes range from 0 to 6 percent. Elevation is 3,600 to 4,800 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine, montmorillonitic, mesic Ustollic Haplargids.

Typical pedon of Ulm loam in an area of Ulm-Forkwood loams, 0 to 6 percent slopes, 2,300 feet south and 1,600 feet east of the northwest corner of sec. 24, T. 40 N., R. 67 W.

A—0 to 5 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak thin platy structure parting to medium fine granular; soft, very friable, slightly sticky and nonplastic; common fine roots; neutral; clear smooth boundary.

Bt1—5 to 9 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium angular blocky; slightly hard, friable, sticky and plastic; common fine roots; many distinct clay films on faces of peds; neutral; clear smooth boundary.

Bt2—9 to 16 inches; grayish brown (10YR 5/2) clay, dark brown (10YR 3/3) moist; strong medium prismatic structure parting to strong medium angular blocky; hard, firm, very sticky and very plastic; common fine and very fine roots; many prominent clay films on faces of peds; slightly alkaline; abrupt smooth boundary.

Bt3—16 to 24 inches; grayish brown (10YR 5/2) clay, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to strong medium angular blocky; hard, firm, very sticky and very plastic; common fine and very fine roots; common distinct clay films on faces of peds; slightly alkaline; clear smooth boundary.

Btk—24 to 37 inches; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) moist; strong fine and medium angular blocky structure; hard, firm, sticky and plastic; few fine and very fine roots; few faint clay films on faces of peds; strongly effervescent, calcium carbonate occurs as few soft masses; moderately alkaline; clear smooth boundary.

Bk—37 to 60 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; strongly effervescent, calcium carbonate occurs as common soft masses and threads; moderately alkaline.

Hue is 2.5Y or 10YR throughout the soil. Depth to horizons containing accumulations of calcium carbonate ranges from 12 to 30 inches. Content of coarse fragments is less than 5 percent throughout the soil.

The A and Bt horizons have neutral or slightly alkaline reaction. The A horizon has value of 5 or 6 dry, 3 through 5 moist, and chroma of 2 through 4. Texture is loam or clay loam. The Bt horizon has value of 5 or 6 dry, 4 or 5 moist, and chroma of 2 through 4. Texture is clay loam or clay. It is 35 to 50 percent clay and 15 to 35 percent fine or coarser sand.

The Bk horizon has value of 5 through 7 dry, 4 through 6 moist, and chroma of 2 through 4. Texture is clay loam or clay. Reaction is moderately or strongly alkaline.

Vetal Series

The Vetal series consists of very deep, well drained soils on alluvial fans, hillslopes, and valley sideslopes and in valleys. The soils formed in alluvium and eolian deposits derived from sandstone. Slopes range from 0 to 9 percent. Elevation is 4,800 to 5,500 feet. The average annual precipitation is 15 to 17 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are coarse-loamy, mixed, mesic Pachic Haplustolls.

Typical pedon of Vetal fine sandy loam, 0 to 3 percent slopes, 700 feet north and 500 feet west of the southeast corner of sec. 5, T. 32 N., R. 60 W.

A—0 to 5 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine and very fine granular structure; soft,

very friable, nonsticky and nonplastic; many fine and very fine and few medium roots; slightly acid; abrupt smooth boundary.

Bw1—5 to 12 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) moist; weak coarse prismatic structure parting to weak medium and coarse subangular blocky; slightly hard, very friable, nonsticky and nonplastic; many fine and very fine and few medium roots; neutral; clear smooth boundary.

Bw2—12 to 24 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to weak medium and coarse subangular blocky; slightly hard, very friable, nonsticky and nonplastic; common fine and very fine and few medium roots; neutral; clear smooth boundary.

BC—24 to 35 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few fine and very fine roots; neutral; gradual wavy boundary.

C—35 to 60 inches; grayish brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and very fine roots; neutral.

The mollic epipedon is 20 to 50 inches thick. The soils are typically noneffervescent throughout the profile, but are effervescent below a depth of 40 inches in some pedons. Content of coarse fragments is less than 10 percent throughout the soil. The Bw horizon is absent in some pedons.

The A and Bw horizons have value of 4 or 5 dry, 2 or 3 moist, and chroma of 2 or 3. Reaction in the A horizon is neutral or slightly acid. The C horizon has value of 5 or 6 dry, 3 through 5 moist, and chroma of 2 or 3. Texture of the Bw and C horizons is fine sandy loam or very fine sandy loam. The Bw horizon is 12 to 18 percent clay. Reaction in the Bw and C horizons is neutral or slightly alkaline.

Vonalee Series

The Vonalee series consists of very deep, well drained soils on alluvial fans, terraces, and footslopes of hills. The soils formed in alluvium derived from sandstone. Slopes range from 0 to 15 percent. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are coarse-loamy, mixed, mesic Ustollic Haplargids.

Typical pedon of Vonalee sandy loam in an area of Terro-Vonalee sandy loams, 0 to 6 percent slopes, 900 feet south and 1,800 feet west of the northeast corner of sec. 1, T. 36 N., R. 65 W.

A—0 to 3 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; weak medium platy structure parting to weak fine granular; soft, very friable, nonsticky and nonplastic; many fine and medium roots; slightly alkaline; clear smooth boundary.

Bt—3 to 11 inches; yellowish brown (10YR 5/4) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate coarse angular blocky structure; slightly hard, friable, slightly sticky and nonplastic; few fine and medium roots; few faint clay films on faces of peds and bridging sand grains; slightly alkaline; clear smooth boundary.

Bk1—11 to 24 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; moderate medium angular blocky structure; slightly hard, friable, nonsticky and nonplastic; few fine roots; slightly effervescent, calcium carbonate occurs as few fine filaments and specks; moderately alkaline; clear smooth boundary.

Bk2—24 to 60 inches; light yellowish brown (10YR 6/4) loamy fine sand, yellowish brown (10YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; strongly effervescent, calcium carbonate occurs as few fine filaments and specks; moderately alkaline.

Hue is 2.5Y or 10YR throughout the soil. Depth to horizons containing accumulations of calcium carbonate ranges from 11 to 40 inches.

The A and Bt horizons have neutral or slightly alkaline reaction. The A horizon has value of 4 through 6 dry, 3 or 4 moist, and chroma of 2 or 3. The Bt horizon has value of 4 through 6 dry, 3 through 5 moist, and chroma of 2 through 4. Texture is sandy loam or fine sandy loam. The Bt horizon is 8 to 18 percent clay.

The Bk horizon has value of 5 through 7 dry, 4 through 6 moist, and chroma of 2 through 4. Texture is loamy sand, loamy fine sand, sandy loam, or fine sandy loam. Reaction is moderately or strongly alkaline.

Wolf Series

The Wolf series consists of deep, well drained soils on stream terraces, alluvial fans, pediments breaks, and hills and in swales. These soils formed in alluvium

derived from various sources. Slopes is 3 to 20 percent. Elevation is 4,800 to 5,500 feet. The average annual precipitation is 15 to 17 inches, the average air temperature is 46 to 50 degrees F, and the frost-free period is 110 to 130 days.

These soils are fine-loamy, mixed, mesic Aridic Argiustolls.

Typical pedon of Wolf loam in an area of Featherlegs-Wolf loams, 0 to 6 percent slopes, in Goshen County, Wyoming, 1,518 feet south and 1,584 feet west of the northeast corner of sec. 17, T. 30 N., R. 64 W.

A—0 to 4 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium and coarse granular structure; slightly hard, very friable, slightly sticky and slightly plastic; slightly alkaline; clear smooth boundary.

Bt—4 to 13 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; strong fine and coarse subangular structure; hard, firm, sticky and plastic; many prominent clay films on faces of peds; slightly alkaline; clear wavy boundary.

Btk—13 to 18 inches; light brownish gray (10YR 6/2) clay loam, grayish brown (10YR 5/2) moist; moderate fine and coarse subangular blocky structure; hard, firm, sticky and plastic; many prominent clay films on faces of peds; strongly effervescent, calcium carbonate occurs as common masses and threads; moderately alkaline; clear wavy boundary.

Bk1—18 to 37 inches; light gray (10YR 7/2) clay loam, light brownish gray (10YR 6/2) moist; moderate fine and coarse subangular blocky

structure; hard, firm, sticky and plastic; strongly effervescent, calcium carbonate is disseminated and occurs as common masses and threads; strongly alkaline; clear wavy boundary.

2Bk—37 to 60 inches; light brownish gray (10YR 6/2) extremely gravelly sandy loam, grayish brown (10YR 5/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; strongly effervescent, calcium carbonate is disseminated and occurs as coatings on rock fragments; 65 percent gravel and cobbles; moderately alkaline.

The mollic epipedon ranges from 7 to 15 inches. Depth to horizons containing accumulations of calcium carbonate ranges from 4 to 15 inches. Depth to the base of the argillic horizon is 10 to 18 inches. Depth to the 2Bk horizon is 30 to 40 inches.

The A and Bt horizons have neutral or slightly alkaline reaction. The A horizon has hue of 2.5Y or 10YR, value of 4 or 5 dry, 2 or 3 moist, and chroma of 2 or 3. The Bt horizon has hue of 2.5Y through 7.5YR. It has value of 4 or 5 dry, and 3 or 4 moist, and chroma of 2 or 3. Texture is loam, sandy clay loam, or clay loam.

Reaction in the Bk and 2Bk horizons is moderately or strongly alkaline. The Bk horizon has hue of 2.5Y or 10YR, value of 6 or 7 dry, 5 or 6 moist, and chroma of 2 or 3. Texture is loam or clay loam. The 2Bk horizon is 55 to 75 percent gravel and cobbles. Calcium carbonate equivalent in the Bk and 2Bk horizons ranges from 15 to 30 percent.

This soil is outside the characteristics defined for the Wolf series because the depth to the base of the argillic horizon is 10 to 18 inches and the depth to the extremely gravelly 2Bk horizon ranges from 30 to 40 inches.

Formation of the Soils

This section discusses the major factors of soil formation as they relate to the soils of Niobrara County.

Factors of Soil Formation

The properties of the soil at any given place result from the integrated effects of the five major factors of soil formation. These factors are parent material from which the soils formed, climate, plant and animal life, relief, and time. Few generalizations can be made regarding the effect of any one factor, because the effect of each is modified by the other four.

Parent Material

Parent material is the unconsolidated material from which a soil is formed. The soils in the survey area formed in three principal types of parent material. These are residuum from bedrock, eolian deposits, and alluvium. Many of the properties of these materials are related to the geologic sources from which they derived.

Niobrara County contains a diverse pattern of surface geologic formations. The youngest of these formations, the Arikaree, underlies most of the southern one-third of the county and outliers of this formation are present as extensive buttes north of the Hat Creek Breaks. The broad upland landforms associated with the Arikaree formation are gently to roughly rolling and are often dissected by canyons and streams, such as the Niobrara River. The most visible exposures of the formation are the escarpments which form the Hat Creek Breaks.

The Arikaree formation consists primarily of a massive, fine grained sandstone containing beds of siltstone, thin lenticular layers of hard concretionary sandstone and soft volcanic ash, and a generally persistent coarse basal conglomerate. The outcrops are commonly light gray to light brownish gray, although in some places the lower beds have the pale pinkish tint characteristic of the underlying White River group. It is pervious and weathers rapidly.

The shallow Taluce and Trelona soils and the moderately deep Cedak, Hargreave, and Phiferson soils formed in materials derived from the Arikaree

formation. This formation has yielded large quantities of alluvium and eolian material, particularly in the southeast and southwest corners of the county and along the Niobrara River and its tributaries. The very deep Albinas, Jayem, Manter, Recluse, and Vetal soils formed in either alluvium or eolian deposits derived from this formation.

The Hartville Uplift extends southwest of Lusk into the southern portion of Niobrara County. These hills consist primarily of red and white sandstone underlain by gray dolomite and limestone, and are a result of the same forces which formed the Rocky Mountains. Outwash sediments from the Rocky Mountains, which also provided the primary constituents of the Arikaree formation, completely covered these hills. Subsequent erosion in many areas re-exhumed the harder, more resistant rock which forms the present landscape. Shallow soils, such as Lithic Haplustolls, formed on the steeper hills. Moderately deep soils, such as Cedak, Hargreave, and Phiferson; and very deep soils, such as Alice, Jayem, Moskee, Recluse, and Vetal, formed in materials derived from the remnant areas of the Arikaree sediments.

The White River formation is immediately underneath the Arikaree formation in Niobrara County. In many places, the boundary between these two formations is gradual and indistinct. As an example, the Seeman Hills in the east-central part of the county have remnants of the somewhat more resistant Arikaree formation overlying the more erosive Brule member of the White River formation.

The White River formation is composed of three members: an upper conglomerate, consisting primarily of a semi-resistant sandstone; the Brule member, composed of pale pink to white blocky claystone and siltstone; and the Chadron member, composed of a light gray to dark red claystone and sandstone. This formation is highly erosive and the processes of erosion and deposition have created a landscape scenario of steep badland areas and small to large alluvial fans. Soils such as Cambria, Kadoka, Kishona, Senlar, and Thirty-nine formed in materials derived from this formation.

The Fort Union formation occurs north of the Hat Creek Breaks along the western border of Niobrara

County. This formation consists primarily of interbedded dark gray and brown shale, soft gray sandstone, and thin coal beds.

The soils formed in material derived from this formation are very erosive when unprotected by vegetation and the erosion has produced a landscape of moderately sloping to steep hillslopes and valley sideslopes dissected by numerous gullies. The sediments are deposited on alluvial fans, stream terraces, and in flood plains. Locally small areas of eolian material occur on the leeward side of hills and ridges.

Soils on hillslopes that formed in residuum derived from this formation include Bowbac, Cushman, Samday, Shingle, Taluce, and Theedle. Soils on terraces or alluvial fans that formed in alluvium or eolian materials derived from this formation include Cambria, Forkwood, Hiland, Keeline, Kishona, Ulm, and Vonalee.

The Lance and Fox Hills formations occur north of the town of Lance Creek and west of U.S. Highway 85 in the northern part of the county. These formations were once sediments that were deposited in the marginal waters during the last advance and retreat of the sea which once covered much of eastern and southern Wyoming.

The Lance formation, formed from sediments deposited primarily in a fresh water environment, consists of brown to gray sandstone and shale and contains thin discontinuous coal beds. The Fox Hills formation, formed from sediments deposited in a marine environment, consists of a light-colored sandstone with thin beds of gray sandy shale. Like many of the other surface geologic formations in Niobrara County, these formations are highly erosive and have yielded a considerable amount of sediment.

Soils on rolling to steep hills and ridges that formed in residuum derived from these formations include Bowbac, Cadoma, Cushman, Orella, Samday, Shingle, Sunup, Taluce, Terro, Theedle, Threetop, and Turnercrest. Soils that formed in alluvium derived from the geologic erosion of this formation include Absted, Arvada, Bahl, Cambria, Forkwood, Keyner, Kishona, Petrie, Skilak, and Ulm. Eolian deposits derived from this formation occur in valleys and more commonly on the leeward side of ridges and hills. Soils that formed in these deposits include Dwyer, Hiland, Orpha, Terro, and Tullock.

The Pierre and Niobrara formations occupy much of eastern, northeastern, and part of central Niobrara County. The Pierre formation is primarily a dark gray concretionary marine shale. The Niobrara formation consists of bedded gray to yellow calcareous shale and light-colored limestone.

The landforms overlying these formations have a distinctive rolling to strongly rolling appearance, with smoothly rounded ridges and hills. The soils in these areas formed primarily in residuum derived from shale, but occasional areas of sediments occur that were deposited on alluvial fans and in narrow drainages. The soils include the shallow Grummit, Hilight, and Samday; the moderately deep Paiges and Savageton; and the very deep Bahl, Bumbob, and Lohmiller.

Areas of recent alluvial and eolian deposits occur along the major creek and river drainages. The characteristics of alluvial deposits are usually highly variable and are primarily dependent upon the geologic formations within the drainage area. The soils that formed in recent alluvial deposits include Clarkelen, Draknab, Haverdad, and Lohmiller.

Recent eolian deposits occur along the leeward side of many of the larger drainages in the central and northern part of the county. These deposits formed as a result of the erosion by the prevailing winds of loose sandy alluvial sediments and the subsequent deposition of the wind blown soil particles. These eolian deposits occur on the higher alluvial fans and terraces that are not subject to flooding. Soils that formed in these eolian deposits include Dwyer, Keeline, and Orpha.

Climate

Climate directly affects the rate of chemical and physical weathering. It also indirectly affects the rate of weathering through the effects of living organisms adapted to the area. Expansion and contraction accompanying freezing and thawing and the wedging action of roots are examples of physical weathering. Rates of chemical weathering are dependent upon temperature, moisture content, and biological activity.

The climate of the survey area is temperate and semi-arid. A large percentage of the annual precipitation falls during the growing season. Evaporation, which is high due to the wind and relatively warm air temperatures during this period, removes a significant amount of the moisture from the soil. As a result, the depth in the soil profile to which water moves is relatively shallow. The accumulation of silicate clay occurs in the upper part of the subsoil within the zone of water movement. The weathering of bedrock is limited by the low available moisture and as a result many moderately deep or shallow soils have formed in place from bedrock. Not completely altered by the cool, dry environment in the soil, many of the properties of the parent material are discernable in all layers of the soils.

Living Organisms

All living organisms, including vegetation, bacteria, fungi, and animals are important to soil formation. Vegetation is the dominant source of organic matter which decomposes and darkens the color of the upper soil horizons. Plant roots increase soil porosity, recycle nutrients, distribute organic matter, and help form soil structural units or aggregates. When the plants parts decompose, the nutrients which have been stored in them return to the soil. Bacteria and fungi decompose the organic matter and the organic reactions and processes of decomposition produce compounds that affect the soil-forming processes. Earthworms, ants, and burrowing animals mix soils and affect soil structure generally making the soil more open and porous.

Man affects the soil structure and porosity by various activities. In some areas, he compacts the soils by foot and vehicle traffic. In other areas, such as those used for growing crops, tillage has reduced water runoff and increased the depth of water movement in the soil. Man's intensive use and disturbance of some soils has caused accelerated soil erosion losses, often accompanied by increased deposition on flood plains and in depressions.

Topography

Relief affects exposure of the soil surface to the sun, surface drainage, amount of water that enters into the soil, and the plant and animal life associated with the soil. It thus affects the soil forming processes.

Runoff on ridges and steep hills limits the amount of water that moves through the soil profile and can also remove soil from the surface layers. Soil development on such landforms may not exceed the rate of erosion. The result is soils with little horizonation. The Shingle and Theedle soils are examples. Soils on toeslopes and alluvial fans receive moisture from adjacent steeper hillslopes and they are commonly very deep and have argillic horizons. Examples are the Forkwood and Recluse soils.

Soils in depressions may receive a great deal of moisture from the surrounding landscape during intense storms. These soils are typically very deep and clayey, and are leached of calcium carbonate to a greater depth than the soils of the surrounding areas. The Bahl soil is an example. Relief also affects the movement of wind.

In some areas, sandstone ridges have been eroded by strong persistent winds and the eolian materials have been deposited on the leeward slopes of the ridges. Orpha and Dwyer are examples of soils that formed in eolian deposits.

Time

The formation of distinct soil horizons is a slow process in the cool, dry climate of this survey area. For example, argillic horizons are present in some soils that occur on landforms that have not been subjected to high rates of erosion or deposition. This stage of development reflects the relative age of the soil.

The young Haverdad and Clarkelen soils are on flood plains which have been subjected to periodic additions of alluvium to the surface. They are too young to have formed diagnostic horizons. The soils that have been subjected to continual erosion on steep hills may not have been exposed to the processes of soil formation for a long enough period to allow argillic horizons to have formed. The young Kishona soils, which occur on alluvial fans, also lack argillic horizons present in the mature Forkwood soils which occur on older, higher-lying alluvial fans.

Processes of Soil Horizon Differentiation

The different layers, or horizons, in a soil show the results of the interaction of the factors of soil formation. Several processes are involved in the formation of soil horizons. Among these are the accumulation of organic matter, the leaching of soluble constituents, the chemical reduction and movement of iron, the formation of soil structure, and the formation and translocation of clay. These processes are often simultaneous and may have been ongoing for thousands of years.

The accumulation and incorporation of organic matter takes place as plant residue and animal-deposited organic material decomposes and is mixed into the soil. These additions darken the mineral soil material.

Most soils contain three major horizons: A, B, and C horizons. The major horizons can be subdivided by the use of numbers and letters to indicate differences within the horizon. The Bt horizon, for example, represents the most developed part of a B horizon and has accumulated clay leached from overlying horizons. The Forkwood soils, for example, have a Bt horizon.

The A horizon is a mineral surface layer and contains the highest percent of organic material. Leaching, or eluviation, of clay, salts, and iron from this horizon is evident in older soils. If considerable leaching has taken place and organic matter has accumulated in only small amounts or has been removed, an E horizon is formed. The E horizon is commonly a light colored horizon.

The B horizon, which underlies the E or A horizon, is called the subsoil. It is the horizon where the clay, iron, salts, aluminum, or other compounds leached from the surface layer accumulate. In some soils, such as Zigweid, the Bw horizon is formed principally by alteration of the parent material. The alteration can be the result of weathering of the parent material, the releasing of iron, and the development of soil structure in place of the original rock or sediment structure. In these soils, the Bk horizon is the layer where calcium carbonate leached from overlying soil horizons has accumulated.

The removal of calcium carbonate from the surface soil layers by percolating water is one of the initial processes that must occur in soils that have a distinct subsoil with an accumulation of clay. This process must occur before clay can be readily moved from the surface horizons. In soils classified as Argiustolls, clay has been leached from overlying horizons. It was deposited in the Bt horizon when flocculation occurred and/or the water was removed from the horizon. In addition, clay formed from translocated silica and

aluminum has accumulated in these horizons. More inert materials, such as silt and sand-sized quartz, are concentrated in the A horizon as the more soluble materials and clay are leached out.

The Bw or Bt horizons commonly have a blocky or prismatic structure; are generally firmer and lighter in color than the A horizon, but are darker colored than the E, Bk, or C horizons. Because B horizons are a product of time, they are not present in the very young soils in the survey area.

The C horizon is below the A or B horizon. It consists of materials little altered by the soil-forming processes but slightly modified by weathering. In young soils such as those formed in recent alluvium, the C horizon may be very near the soil surface.

The Bt horizon is commonly yellowish brown or reddish brown in the well drained and moderately well drained soils in the county. These colors are the result of iron oxide coatings on sand, silt, and clay particles. The iron oxide formed from iron released during the weathering of silicate minerals.

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Glossary

- Aeration, soil.** The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.
- Aggregate, soil.** Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.
- Alkali (sodic) soil.** A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.
- Alluvial fan.** The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.
- Alluvium.** Material, such as sand, silt, or clay, deposited on land by streams.
- 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.
- 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 3.5 |
| Low | 3.5 to 5 |
| Moderate | 5 to 7.5 |
| High | more than 7.5 |
- Badland.** Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.
- Base saturation.** The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, 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.
- 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.
- Bottom land.** The normal flood plain of a stream, subject to flooding.
- Breaks.** The steep to very steep broken land at the border of an upland summit that is dissected by ravines.
- Brush management.** Use of mechanical, chemical, or biological methods to 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.

- Calcareous soil.** A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.
- 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.
- 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.
- Channery soil material.** Soil material that is 15 to 35 percent, by volume, thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. Very channery soil material is 35 to 60 percent of these rock fragments, and extremely channery soil material is more than 60 percent. 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.
- Clay.** As a soil separate, the mineral soil particles less than 0.002 millimeter, in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.
- Clay film.** A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.
- 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.
- 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.
- Colluvium.** Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.
- 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.
- 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.

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.

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 seeded in conjunction with a grass seeding operation to protect the soil until the grass seedlings have become well established.

Critical area planting. Planting vegetation, such as trees, shrubs, grasses, or legumes, on highly erodible or critically eroding areas.

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.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or arresting grazing for a prescribed period.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

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.

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.

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.
- 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.
- Excess alkali** (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.
- Excess fines** (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.
- Excess lime** (in tables). Excess carbonates in the soil that restrict the growth of some plants.
- Excess salts** (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.
- 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.
- Fast intake** (in tables). The rapid movement of water into the soil.
- Fertility, soil.** The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when

light, moisture, temperature, tilth, and other growth factors are favorable.

- Field moisture capacity.** The moisture content of a soil, expressed as a percentage of the oven-dry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity*, *normal moisture capacity*, or *capillary capacity*.
- Fine earth.** The particles of the soil that are smaller than 2 millimeters in diameter, or the sand, silt, and clay portion of the soil. (See Texture, soil.)
- Fine textured soil.** Sandy clay, silty clay, and clay.
- Flood plain.** A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.
- 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.
- Footslope.** The inclined surface at the base of a hill.
- Forb.** Any herbaceous plant not a grass or a sedge.
- Fragile** (in tables). A soil that is easily damaged by use or disturbance.
- Frost action** (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.
- Genesis, soil.** The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.
- Gleyed soil.** Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.
- 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.
- Groundwater** (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.

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.

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.

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.

Increasesers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasesers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration 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.

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives groundwater 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—
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.
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.
- Knoll.** A small, low, rounded hill rising above adjacent landforms.
- 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 strength.** The soil is not strong enough to support loads.
- 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, and fine sandy loam.
- Moderately fine textured soil.** Clay loam, sandy clay loam, and silty clay loam.
- Morphology, soil.** The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.
- Mottling, soil.** Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common, and many*; size—*fine, medium, and coarse*; and contrast—*faint, distinct, and prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).
- 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.
- Munsell notation.** A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color in 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 is generally low in relief.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pediment. A gently sloping erosional surface developed at the foot of a receding hill.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percolates slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 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.

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.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential native plant community. 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.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range condition. The present composition of the plant community on a range site in relation to the

potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor on the basis of how much the present plant community has departed from the potential.

Range renovation. Practices such as furrowing on the contour, pitting, chiseling, or disking. Improves plant cover by increasing water infiltration and available moisture.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as pH values are—

Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

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 is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root zone. The part of the soil that can be penetrated by plant roots.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts 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 groundwater.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Salty water (in tables.) Water that is too salty for consumption by livestock.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

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.

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.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Shoulder. The uppermost inclined surface at the top of a hillslope.

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.

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 is generally silty or clayey, is slippery when wet, and is low in productivity.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey the following slope classes are recognized:

- Nearly level 0 to 3 percent
- Gently sloping 3 to 6 percent
- Moderately sloping 6 to 10 percent

- Strongly sloping 10 to 15 percent
- Moderately steep 15 to 20 percent
- Steep 20 to 40 percent
- Very steep 40 and higher percent

Slope (in tables). Slope is great enough that special practices are required to insure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

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 $Ca^{++} + Mg^{++}$.

- | | |
|----------------|----------------|
| | SAR |
| Slight | Less than 13:1 |
| Moderate | 12-30:1 |
| 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 depth. The thickness of the soil mantle over bedrock; i.e., very shallow is 4 to 10 inches thick, shallow is 10 to 20 inches thick, moderately deep is 20 to 40 inches thick, deep is 40 to 60 inches thick, very deep is more than 60 inches thick.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

- Very coarse sand 2.0 to 1.0 millimeters
- Coarse sand 1.0 to 0.5 millimeters
- Medium sand 0.5 to 0.25 millimeters

Fine sand	0.25 to 0.10 millimeters
Very fine sand	0.10 to 0.05 millimeters
Silt	0.05 to 0.002 millimeters
Clay	less than 0.002 millimeters

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.

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 wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind 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.

Substratum. The part of the soil below the solum.

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.

Summer wildlife habitat. A population or portion of a population uses this habitat annually during the summer, but not during the winter.

Surface layer. In tilled soils, the part of the soil ordinarily moved in tillage ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.” In uncultivated soils, the part of the soil designated as the “A horizon.”

Talus. Rock fragments of any size or shape, commonly coarse and angular, derived from and lying at the base of a cliff or very steep, rock slope. The accumulated mass of such loose, broken rock formed chiefly by falling, rolling, or sliding.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

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 is generally 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.

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 footslope.

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.

Toxicity (in tables). Excessive amount of toxic substances, such as sodium or sulfur, that severely hinder establishment of vegetation or severely restrict plant growth.

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.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial melt water. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the

earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an oven-dry basis, at which a plant (specifically 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.

Winter wildlife habitat. A population or portion of a population uses this habitat annually only during the winter. A substantial number of animals use the habitat during this period.

Year-long wildlife habitat. A population or a substantial portion of a population uses this habitat during all seasons of the year.

Tables

Table 1A—Temperature and Precipitation

Station : LUSK 2 SW, 5830
 start yr. - 1916 end yr. - 1992

Month	Temperature						Precipitation			
				2 years in 10			2 yrs in 10		average	
	avg	avg	avg	max	min	no. of	avg	less	more	number of
daily	daily		temp.	temp.	grow'n	avg	than	than	days with	
	max	min	>than	<than	days*	(in.)	(in.)	(in.)	0.10 inch	or more
January	35.3	11.0	23.1	59	-22	5	0.52	0.21	0.79	1
February	39.9	15.1	27.5	63	-17	13	0.50	0.21	0.77	1
March	46.0	20.0	33.0	72	-8	45	0.98	0.38	1.48	2
April	56.7	28.9	42.8	80	5	157	2.09	0.96	3.05	4
May	66.6	38.4	52.5	89	21	383	2.86	1.31	4.19	6
June	77.6	47.4	62.5	98	31	618	2.48	1.17	3.61	5
July	86.4	53.4	69.9	100	39	870	1.72	0.88	2.50	4
August	84.9	51.2	68.1	98	36	821	1.06	0.32	1.69	2
September	75.1	41.1	58.1	94	21	524	1.13	0.38	1.97	2
October	62.3	31.2	46.7	84	9	241	0.90	0.28	1.47	2
November	46.7	21.1	33.9	71	-7	48	0.61	0.28	0.98	2
December	37.7	13.5	25.6	63	-19	13	0.51	0.20	0.81	1
Yearly :										
Average	59.6	31.0	45.3	—	—	—	—	—	—	—
Extreme	105	-38	—	101	-27	—	—	—	—	—
Total	—	—	—	—	—	3737	15.35	9.63	19.18	32

*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 (Threshold : 40.0 deg. F)

Table 1B—Temperature and Precipitation

Station : HAT CREEK 5 E, 4303
 start yr. - 1968 end yr. - 1984

Month	Temperature						Precipitation			
				2 years in 10		avg	2 yrs in 10			average number of days with 0.10 inch or more
	avg	avg	avg	max	min		will have	less	more	
daily	daily		temp.	temp.	degree	than	than	than	days*	
	max	min		>than	<than		(in.)	(in.)	(in.)	
January	32.4	9.0	20.7	60	-25	7	0.52	0.25	0.76	2
February	39.9	15.9	27.9	65	-20	16	0.45	0.26	0.68	2
March	46.9	22.1	34.5	72	-8	46	1.11	0.41	1.70	3
April	56.6	31.1	43.8	82	4	171	2.45	1.55	3.27	5
May	66.4	39.9	53.1	86	23	362	2.67	1.28	3.88	5
June	79.4	49.3	64.4	98	32	635	2.10	0.94	3.09	5
July	87.3	56.3	71.8	102	40	839	2.21	1.05	3.21	5
August	85.5	54.1	69.8	101	38	776	1.65	0.46	2.82	3
September	76.4	43.9	60.2	97	21	560	1.05	0.23	1.97	3
October	61.1	31.7	46.4	95	6	230	1.04	0.65	1.39	2
November	45.3	21.4	33.3	79	-11	57	0.70	0.24	1.09	2
December	37.8	14.4	26.1	65	-20	18	0.40	0.13	0.72	1
Yearly :										
Average	59.6	32.4	46.0	—	—	—	—	—	—	—
Extreme	105	-32	—	106	-27	—	—	—	—	—
Total	—	—	—	—	—	3717	16.36	7.87	21.98	38

*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 (Threshold : 40.0 deg. F)

Table 1C—Temperature and Precipitation

Station : REDBIRD 1 NW, 7555
 start yr. - 1949 end yr. - 1992

Month	Temperature						Precipitation			
	avg daily max	avg daily min	avg	2 years in 10 will have		avg no. of grow'n degree days*	2 yrs in 10 will have			average number of days with 0.10 inch or more
				max temp. >than	min temp. <than		avg (in.)	less than (in.)	more than (in.)	
January	34.6	6.6	20.6	61	-33	5	0.27	0.11	0.42	0
February	41.0	13.0	27.0	67	-26	15	0.38	0.10	0.65	1
March	48.7	20.6	34.6	76	-15	62	0.70	0.33	1.05	2
April	60.4	30.7	45.6	86	7	216	1.58	0.66	2.35	3
May	70.4	40.9	55.7	92	21	485	2.57	1.16	3.78	6
June	81.4	49.8	65.6	102	32	749	2.45	1.19	3.55	5
July	90.4	56.1	73.3	106	41	1026	1.92	0.91	2.79	4
August	88.7	53.6	71.1	103	36	964	1.44	0.52	2.20	3
September	77.7	42.1	59.9	98	20	599	1.20	0.33	1.89	3
October	65.0	30.7	47.9	88	6	274	0.78	0.29	1.21	2
November	47.5	18.7	33.1	74	-14	44	0.50	0.20	0.85	1
December	37.4	9.1	23.3	65	-28	8	0.30	0.13	0.47	1
Yearly :										
Average	61.9	31.0	46.5	—	—	—	—	—	—	—
Extreme	112	-47	—	106	-37	—	—	—	—	—
Total	—	—	—	—	—	4446	14.08	11.19	16.59	31

*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 (Threshold : 40.0 deg. F)

Table 2A—Freeze Dates in Spring and Fall

Station : LUSK 2 SW, 5830
 missing days: from 1916 to 1992 ==> 6 in spring and 8 in fall
 start yr. - 1916 end yr. - 1992

Probability	Temperature		
	24F or lower	28F or lower	32F or lower
Last freezing temperature in spring:			
1 year in 10 later than -	May 15	May 27	June 10
2 year in 10 later than -	May 10	May 21	June 4
5 year in 10 later than -	April 29	May 11	May 24
First freezing temperature in fall:			
1 yr in 10 earlier than -	September 18	September 10	September 2
2 yr in 10 earlier than -	September 24	September 15	September 7
5 yr in 10 earlier than -	October 5	September 25	September 15

Table 2B—Freeze Dates in Spring and Fall

Station : HAT CREEK 5 E, 4303
 missing days: from 1970 to 1984 ==> 1 in spring and 2 in fall
 start yr. - 1970 end yr. - 1984

Probability	Temperature		
	24F or lower	28F or lower	32F or lower
Last freezing temperature in spring:			
1 year in 10 later than -	May 6	May 18	June 5
2 year in 10 later than -	April 30	May 14	May 30
5 year in 10 later than -	April 19	May 6	May 20
First freezing temperature in fall:			
1 yr in 10 earlier than -	September 22	September 16	September 7
2 yr in 10 earlier than -	September 27	September 19	September 10
5 yr in 10 earlier than -	October 8	September 26	September 17

Table 2C-Freeze Dates in Spring and Fall

Station : REDBIRD 1 NW, 7555
 missing days: from 1949 to 1992 ==> 1 in spring and 1 in fall
 start yr. - 1949 end yr. - 1992

Probability	Temperature		
	24F or lower	28F or lower	32F or lower
Last freezing temperature in spring:			
1 year in 10 later than -	May 13	May 22	June 6
2 year in 10 later than -	May 7	May 16	June 1
5 year in 10 later than -	April 25	May 6	May 22
First freezing temperature in fall:			
1 yr in 10 earlier than -	September 16	September 12	September 3
2 yr in 10 earlier than -	September 22	September 16	September 8
5 yr in 10 earlier than -	October 2	September 24	September 17

Table 3A-Growing Season

Station : LUSK 2 SW, 5830
 8 years from 1916 to 1992 have 25 days or more missing data
 start yr. - 1916 end yr. - 1992

Probability	Daily Minimum Temperature		
	# days > 24F	# days > 28F	# days > 32F
9 years in 10	127	112	90
8 years in 10	134	119	98
5 years in 10	148	132	113
2 years in 10	161	146	128
1 year in 10	169	153	136

Table 3B-Growing Season

Station : HAT CREEK 5 E, 4303
 1 year from 1970 to 1984 has 25 days or more missing data
 start yr. - 1970 end yr. - 1984

Probability	Daily Minimum Temperature		
	# days > 24F	# days > 28F	# days > 32F
9 years in 10	132	120	99
8 years in 10	142	126	105
5 years in 10	160	138	119
2 years in 10	178	149	132
1 year in 10	187	155	139

Table 3C-Growing Season

Station : REDBIRD 1 NW, 7555
 1 year from 1949 to 1992 has 25 days or more missing data
 start yr. - 1949 end yr. - 1992

Probability	Daily Minimum Temperature		
	# days > 24F	# days > 28F	# days > 32F
9 years in 10	131	119	97
8 years in 10	138	125	104
5 years in 10	152	138	116
2 years in 10	165	151	128
1 year in 10	172	157	134

Table 4.-Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
100	Absted-Arvada complex, 0 to 3 percent slopes-----	5,799	0.3
101	Absted-Cambria loams, 0 to 3 percent slopes-----	7,877	0.5
102	Albinas-Recluse loams, 0 to 6 percent slopes-----	5,664	0.3
103	Alice-Manter fine sandy loams, 0 to 6 percent slopes-----	3,873	0.2
104	Alice-Phiferson fine sandy loams, 3 to 10 percent slopes-----	7,240	0.4
105	Badland-----	13,871	0.8
106	Bahl clay, 0 to 6 percent slopes-----	14,250	0.8
107	Bahl-Petrie complex, 0 to 3 percent slopes-----	11,952	0.7
108	Bayard fine sandy loam, 0 to 3 percent slopes-----	1,758	0.1
109	Bidman-Slickspots complex, 0 to 3 percent slopes-----	73	*
110	Brownrigg-Featherlegs-Wolf complex, 10 to 40 percent slopes-----	1,280	*
111	Bumbob-Rhoame clays, 0 to 6 percent slopes-----	3,810	0.2
112	Busher-Phiferson loamy very fine sands, 0 to 6 percent slopes-----	8,005	0.5
113	Cadoma silty clay loam, 2 to 10 percent slopes-----	217	*
114	Cedak-Trelona complex, 6 to 20 percent slopes-----	36	*
115	Clarkelen fine sandy loam, overflow, 0 to 3 percent slopes-----	8,698	0.5
116	Clarkelen-Draknab-Dwyer complex, 0 to 6 percent slopes-----	15,827	0.9
117	Coaliams loam, 0 to 6 percent slopes-----	3,868	0.2
118	Cushman-Forkwood loams, 0 to 6 percent slopes-----	6,811	0.4
119	Dailey-Orpha, moist, loamy sands, 0 to 6 percent slopes-----	10,637	0.6
120	Draknab loamy fine sand, 0 to 3 percent slopes-----	21	*
121	Endoaquolls-Torrifluvents complex, 0 to 3 percent slopes-----	2,389	0.1
122	Epping-Badland complex, 3 to 50 percent slopes-----	12,265	0.7
123	Featherlegs-Wolf loams, 0 to 6 percent slopes-----	100	*
124	Featherlegs-Wolf loams, 6 to 10 percent slopes-----	141	*
125	Featherlegs-Wolf-Brownrigg complex, 3 to 10 percent slopes-----	533	*
126	Forkwood-Cambria loams, 0 to 6 percent slopes-----	31,717	1.8
127	Forkwood-Cambria-Cushman loams, 6 to 15 percent slopes-----	26,506	1.5
128	Forkwood-Cushman-Terro complex, 2 to 10 percent slopes-----	83	*
129	Grummit, cool-Rock outcrop complex, 6 to 40 percent slopes-----	1,765	0.1
130	Grummit, warm-Rock outcrop complex, 6 to 40 percent slopes-----	2,751	0.2
131	Grummit-Hilight clays, 6 to 15 percent slopes-----	2,520	0.1
132	Grummit-Hilight-Rock outcrop complex, 15 to 45 percent slopes-----	7,676	0.4
133	Hargreave-Cedak fine sandy loams, 2 to 10 percent slopes-----	7,177	0.4
134	Hargreave-Lambman association, 1 to 8 percent slopes-----	7,319	0.4
135	Hargreave-Noden fine sandy loams, 0 to 6 percent slopes-----	22,541	1.3
136	Haverdad loam, overflow, 0 to 4 percent slopes-----	10,828	0.6
137	Haverdad-Clarkelen complex, 0 to 3 percent slopes-----	24,102	1.4
138	Haverdad-Clarkelen complex, saline, 0 to 3 percent slopes-----	4,848	0.3
139	Hiland sandy loam, 0 to 6 percent slopes-----	1,595	*
140	Hiland-Bowbac sandy loams, 0 to 6 percent slopes-----	14,202	0.8
141	Hiland-Bowbac associaton, 6 to 15 percent slopes-----	15,491	0.9
142	Hilight-Rock outcrop complex, 6 to 40 percent slopes-----	30,193	1.8
143	Hilight-Savageton clays, 6 to 15 percent slopes-----	40,586	2.4
144	Jayem-Julesburg fine sandy loams, 0 to 6 percent slopes-----	74,952	4.4
145	Jayem-Julesburg fine sandy loams, 6 to 15 percent slopes-----	32,305	1.9
146	Jayem-Phiferson-Trelona fine sandy loams, 3 to 10 percent slopes-----	67,994	4.0
147	Keeline fine sandy loam, 0 to 6 percent slopes-----	7,156	0.4
148	Keeline fine sandy loam, 6 to 10 percent slopes-----	6,593	0.4
149	Keeline-Kishona association, 0 to 6 percent slopes-----	10,815	0.6
150	Keeline-Kishona-Theedle complex, 6 to 30 percent slopes-----	22,099	1.3
151	Keyner-Slickspots complex, 0 to 6 percent slopes-----	4,502	0.3
152	Kishona silty clay loam, sodic, 0 to 6 percent slopes-----	2,032	0.1
153	Kishona-Cambria loams, 0 to 6 percent slopes-----	56,191	3.3
154	Kishona-Cambria-Theedle loams, 6 to 15 percent slopes-----	54,583	3.2
155	Las Animas fine sandy loam, 0 to 2 percent slopes-----	42	*
156	Lithic Haplustolls-Rock outcrop complex, 6 to 60 percent slopes-----	15,680	0.9
157	Lithic Haplustolls, moist-Rock outcrop complex, 6 to 60 percent slopes-----	5,390	0.3
158	Lohmiller silty clay, 0 to 3 percent slopes-----	3,515	0.2
159	Lohmiller-Haverdad complex, saline, 1 to 4 percent slopes-----	465	*
160	Manzanola silty clay loam, 0 to 6 percent slopes-----	197	*
161	Minnequa silt loam, 2 to 6 percent slopes-----	222	*
162	Minnequa-Midway silty clay loams, 6 to 25 percent slopes-----	42	*
163	Moskee fine sandy loam, 0 to 3 percent slopes-----	6,786	0.4

Table 4.-Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
164	Moskee-Manter fine sandy loams, 3 to 10 percent slopes-----	18,733	1.1
165	Moskee-Manter complex, dry, 0 to 6 percent slopes-----	2,844	0.2
166	Noden fine sandy loam, 0 to 3 percent slopes-----	9,033	0.5
167	Orella-Cadoma-Rock outcrop complex, 3 to 25 percent slopes-----	4,251	0.2
168	Orpha, moist-Dailey loamy fine sands, 6 to 15 percent slopes-----	8,209	0.5
169	Orpha-Dwyer fine sands, 0 to 6 percent slopes-----	3,573	0.2
170	Orpha-Dwyer-Taluca complex, 6 to 15 percent slopes-----	3,418	0.2
171	Oxyaquic Torrifluvents, 0 to 3 percent slopes-----	1,270	*
172	Paiges clay loam, 3 to 10 percent slopes-----	3,495	0.2
173	Phiferson-Tassel-Rock outcrop complex, 6 to 30 percent slopes-----	36,855	2.1
174	Phiferson-Trelona fine sandy loams, 3 to 10 percent slopes-----	21,744	1.3
175	Pierre silty clay, 6 to 15 percent slopes-----	552	*
176	Pierre-Grummit clays, 6 to 25 percent slopes-----	414	*
177	Recluse loam, dry, 0 to 6 percent slopes-----	4,126	0.2
178	Recluse-Cedak loams, 0 to 6 percent slopes-----	24,585	1.4
179	Recluse-Cedak loams, 6 to 10 percent slopes-----	11,065	0.6
180	Rhoame-Bahl clays, 0 to 6 percent slopes-----	7,116	0.4
181	Rock outcrop-----	2,356	0.1
182	Rock outcrop-Tassel complex, 6 to 70 percent slopes-----	13,288	0.8
183	Samday clay, 3 to 10 percent slopes-----	3,155	0.2
184	Samday-Pierre clays, 3 to 30 percent slopes-----	1,108	*
185	Samday-Savageton-Bahl association, 3 to 10 percent slopes-----	12,470	0.7
186	Savageton-Bahl clay loams, 3 to 10 percent slopes-----	19,105	1.1
187	Schamber-Tulloch complex, 3 to 30 percent slopes-----	2,749	0.2
188	Senlar silt loam, 0 to 3 percent slopes-----	2,111	0.1
189	Shingle-Rock outcrop-Samday complex, 10 to 30 percent slopes-----	94,930	5.5
190	Silhouette silt loam, 0 to 6 percent slopes-----	2,309	0.1
191	Skilak-Kishona complex, 0 to 6 percent slopes-----	9,665	0.6
192	Sunup-Rock outcrop complex, 10 to 40 percent slopes-----	4,935	0.3
193	Taluca, cool-Keeline fine sandy loams, 6 to 40 percent slopes-----	10,000	0.6
194	Taluca-Rock outcrop-Shingle complex, 6 to 45 percent slopes-----	111,268	6.5
195	Taluca-Rock outcrop-Turnercrest complex, 6 to 50 percent slopes-----	766	*
196	Taluca-Shingle complex, 3 to 20 percent slopes-----	14,010	0.8
197	Taluca-Tulloch-Rock outcrop complex, 3 to 45 percent slopes-----	13,722	0.8
198	Taluca-Turnercrest-Keeline fine sandy loams, 3 to 20 percent slopes-----	42,300	2.5
199	Tassel-Ponderosa-Rock outcrop association, 9 to 70 percent slopes-----	355	*
200	Tassel-Trelona-Phiferson fine sandy loams, 3 to 10 percent slopes-----	10,277	0.6
201	Terro-Turnercrest sandy loams, 2 to 10 percent slopes-----	62	*
202	Terro-Vonalee sandy loams, 0 to 6 percent slopes-----	7,423	0.4
203	Terro-Vonalee-Taluca association, 6 to 30 percent slopes-----	30,603	1.8
204	Theedle-Kishona loams, 0 to 6 percent slopes-----	11,711	0.7
205	Theedle-Kishona loams, 6 to 15 percent slopes-----	26,010	1.5
206	Theedle-Kishona-Shingle loams, 3 to 20 percent slopes-----	75,698	4.4
207	Thirtynine silt loam, 0 to 6 percent slopes-----	15,479	0.9
208	Thirtynine-Kadoka silt loams, 2 to 10 percent slopes-----	10,605	0.6
209	Threetop-Sunup complex, 3 to 15 percent slopes-----	5,416	0.3
210	Torrington-Julesburg very fine sandy loams, 0 to 6 percent slopes-----	6,801	0.4
211	Torriorthents, very steep-----	9,607	0.6
212	Trelona-Phiferson-Vetal fine sandy loams, 6 to 30 percent slopes-----	11,031	0.6
213	Ulm clay loam, 0 to 6 percent slopes-----	3,103	0.2
214	Ulm-Bidman loams, 0 to 6 percent slopes-----	183	*
215	Ulm-Forkwood loams, 0 to 6 percent slopes-----	10,380	0.6
216	Ustic Torriorthents, gullied, 3 to 45 percent slopes-----	109,442	6.4
217	Ustic Torriorthents, cool-Torriorthentic Haplustolls- Rock outcrop complex, 6 to 60 percent slopes-----	32,221	1.9
218	Vetal fine sandy loam, 0 to 3 percent slopes-----	16,426	1.0
219	Vetal fine sandy loam, 3 to 9 percent slopes-----	2,492	0.1
220	Vetal-Phiferson fine sandy loams, 0 to 6 percent slopes-----	11,948	0.7
221	Vetal-Phiferson fine sandy loams, 6 to 15 percent slopes-----	5,428	0.3
222	Vonalee sandy loam, 0 to 6 percent slopes-----	3,882	0.2
223	Vonalee-Keeline fine sandy loams, 2 to 10 percent slopes-----	7,971	0.5
224	Water-----	1,580	*
	Total-----	1,718,048	100.0

* Less than 0.1 percent.

Table 5.-Land Capability Classes and Yields
Per Acre of Crops and Pasture

(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		Wheat, winter		Alfalfa hay	
	N	I	N	I	N	I
			Bu	Bu	Tons	Tons
100:						
Absted-----	VI s	---	---	---	---	---
Arvada-----	VI s	---	---	---	---	---
101:						
Absted-----	VI s	---	---	---	---	---
Cambria-----	IV e	---	---	---	---	---
102:						
Albinas-----	III e	III e	38	---	---	5.0
Recluse-----	III e	III e	30	---	---	5.5
103:						
Alice-----	III e	III e	30	---	---	4.0
Manter-----	III e	III e	30	---	---	5.0
104:						
Alice-----	IV e	IV e	30	---	---	4.0
Phiferson-----	IV e	IV e	20	---	---	3.5
105*:	VIII	---	---	---	---	---
Badland						
106:	IV s	---	---	---	---	---
Bahl						
107:						
Bahl-----	IV s	---	---	---	---	---
Petrie-----	VI s	---	---	---	---	---
108:	III e	III e	30	---	---	4.0
Bayard						
109*:						
Bidman-----	IV e	---	---	---	---	---
Slickspots-----	VII s	---	---	---	---	---
110:						
Brownrigg-----	VII e	---	---	---	---	---
Featherlegs-----	VI e	---	---	---	---	---
Wolf-----	VI e	---	---	---	---	---
111:						
Bumbob-----	IV s	---	---	---	---	---
Rhoame-----	IV s	---	---	---	---	---

Table 5.-Land Capability Classes and Yields
Per Acre of Crops and Pasture--Continued

(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		Wheat, winter		Alfalfa hay	
	N	I	N	I	N	I
			Bu	Bu	Tons	Tons
112:						
Busher-----	VIe	---	---	---	---	---
Phiferson-----	VIe	---	---	---	---	---
113-----	VIe	---	---	---	---	---
Cadoma						
114:						
Cedak-----	IVe	---	---	---	---	---
Trelona-----	VIIe	---	---	---	---	---
115-----	IVe	---	---	---	---	---
Clarkelen, overflow						
116:						
Clarkelen-----	IVe	---	---	---	---	---
Draknab-----	IVe	---	---	---	---	---
Dwyer-----	VIe	---	---	---	---	---
117-----	IIIe	IIIe	34	---	---	4.5
Coaliams						
118:						
Cushman-----	IVe	---	---	---	---	---
Forkwood-----	IVe	---	---	---	---	---
119:						
Dailey-----	VIe	---	---	---	---	---
Orpha, moist---	VIe	---	---	---	---	---
120-----	IVe	---	---	---	---	---
Draknab						
121:						
Endoaguolls----	Vw	---	---	---	---	---
Torrifluvents--	Vw	---	---	---	---	---
122*:						
Epping-----	VIIe	---	---	---	---	---
Badland-----	VIII	---	---	---	---	---
123:						
Featherlegs----	IIIe	---	---	---	---	---
Wolf-----	IIIe	---	---	---	---	---

Table 5.-Land Capability Classes and Yields
Per Acre of Crops and Pasture--Continued

(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		Wheat, winter		Alfalfa hay	
	N	I	N	I	N	I
			Bu	Bu	Tons	Tons
124:						
Featherlegs----	IVe	---	---	---	---	---
Wolf-----	IVe	---	---	---	---	---
125:						
Featherlegs----	IIIe	---	---	---	---	---
Wolf-----	IIIe	---	---	---	---	---
Brownrigg-----	VIIe	---	---	---	---	---
126:						
Forkwood-----	IVe	---	---	---	---	---
Cambria-----	IVe	---	---	---	---	---
127:						
Forkwood-----	IVe	---	---	---	---	---
Cambria-----	IVe	---	---	---	---	---
Cushman-----	IVe	---	---	---	---	---
128:						
Forkwood-----	IVe	---	---	---	---	---
Cushman-----	IVe	---	---	---	---	---
Terro-----	IVe	---	---	---	---	---
129*:						
Grummit, cool--	VIIe	---	---	---	---	---
Rock outcrop---	VIII	---	---	---	---	---
130*:						
Grummit-----	VIIe	---	---	---	---	---
Rock outcrop---	VIII	---	---	---	---	---
131:						
Grummit-----	VIe	---	---	---	---	---
Hilight-----	VIe	---	---	---	---	---
132*:						
Grummit-----	VIIe	---	---	---	---	---
Hilight-----	VIIe	---	---	---	---	---
Rock outcrop---	VIII	---	---	---	---	---

Table 5.-Land Capability Classes and Yields
Per Acre of Crops and Pasture--Continued

(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		Wheat, winter		Alfalfa hay	
	N	I	N	I	N	I
			Bu	Bu	Tons	Tons
133:						
Hargreave-----	IVe	---	---	---	---	---
Cedak-----	IVe	---	---	---	---	---
134*:						
Hargreave-----	IVe	---	---	---	---	---
Lambman-----	VIe	---	---	---	---	---
135:						
Hargreave-----	IVe	IVe	27	---	---	4.5
Noden-----	IIIe	IIIe	30	---	---	4.5
136-----	IVe	---	---	---	---	---
Haverdad, overflow						
137:						
Haverdad-----	IVe	---	---	---	---	---
Clarkelen-----	IVe	---	---	---	---	---
138:						
Haverdad, saline-----	IVs	---	---	---	---	---
Clarkelen, saline-----	IVs	---	---	---	---	---
139-----	IVe	---	---	---	---	---
Hiland						
140:						
Hiland-----	IVe	---	---	---	---	---
Bowbac-----	IVe	---	---	---	---	---
141*:						
Hiland-----	IVe	---	---	---	---	---
Bowbac-----	IVe	---	---	---	---	---
142*:						
Hilight-----	VIIe	---	---	---	---	---
Rock outcrop---	VIII	---	---	---	---	---
143:						
Hilight-----	VIe	---	---	---	---	---
Savageton-----	IVe	---	---	---	---	---

Table 5.-Land Capability Classes and Yields
Per Acre of Crops and Pasture--Continued

(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		Wheat, winter		Alfalfa hay	
	N	I	N	I	N	I
			Bu	Bu	Tons	Tons
144:						
Jayem-----	IIIe	IIIe	30	---	---	5.0
Julesburg-----	IIIe	IIIe	30	---	---	5.0
145:						
Jayem-----	IVe	IVe	24	---	---	4.0
Julesburg-----	IVe	IVe	26	---	---	4.0
146:						
Jayem-----	IVe	---	---	---	---	---
Phiferson-----	IVe	---	---	---	---	---
Trelona-----	VIe	---	---	---	---	---
147, 148-----	IVe	---	---	---	---	---
Keeline						
149*:						
Keeline-----	IVe	---	---	---	---	---
Kishona-----	IVe	---	---	---	---	---
150:						
Keeline-----	VIe	---	---	---	---	---
Kishona-----	VIe	---	---	---	---	---
Theedle-----	VIe	---	---	---	---	---
151*:						
Keyner-----	VIIs	---	---	---	---	---
Slickspots-----	VIIS	---	---	---	---	---
152-----	VIIs	---	---	---	---	---
Kishona, sodic						
153:						
Kishona-----	IVe	---	---	---	---	---
Cambria-----	IVe	---	---	---	---	---
154:						
Kishona-----	IVe	---	---	---	---	---
Cambria-----	IVe	---	---	---	---	---
Theedle-----	IVe	---	---	---	---	---

Table 5.-Land Capability Classes and Yields
Per Acre of Crops and Pasture--Continued

(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		Wheat, winter		Alfalfa hay	
	N	I	N	I	N	I
			Bu	Bu	Tons	Tons
155----- Las Animas	IIIw	---	---	---	---	---
156*, 157*: Lithic Haplustolls---	VIIe	---	---	---	---	---
Rock outcrop---	VIII	---	---	---	---	---
158----- Lohmiller	IVe	---	---	---	---	---
159: Lohmiller, saline-----	IVs	---	---	---	---	---
Haverdad, saline-----	IVs	---	---	---	---	---
160----- Manzanola	IVe	---	---	---	---	---
161----- Minnequa	IVe	---	---	---	---	---
162: Minnequa-----	VIe	---	---	---	---	---
Midway-----	VIe	---	---	---	---	---
163----- Moskee	IIIe	IIIe	30	---	---	5.5
164: Moskee-----	IVe	IVe	28	---	---	5.0
Manter-----	IVe	IVe	28	---	---	4.5
165: Moskee, dry----	IVe	---	---	---	---	---
Manter, dry----	IVe	---	---	---	---	---
166----- Noden	IIIe	IIIe	30	---	---	4.5
167*: Orella-----	VIIe	---	---	---	---	---
Cadoma-----	VIe	---	---	---	---	---
Rock outcrop---	VIII	---	---	---	---	---

Table 5.-Land Capability Classes and Yields
Per Acre of Crops and Pasture--Continued

(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		Wheat, winter		Alfalfa hay	
	N	I	N	I	N	I
			Bu	Bu	Tons	Tons
168:						
Orpha, moist----	VIe	---	---	---	---	---
Dailey-----	VIe	---	---	---	---	---
169:						
Orpha-----	VIe	---	---	---	---	---
Dwyer-----	VIe	---	---	---	---	---
170:						
Orpha-----	VIe	---	---	---	---	---
Dwyer-----	VIe	---	---	---	---	---
Taluce-----	VIIe	---	---	---	---	---
171:						
Oxyaquic Torrifluvents-	Vw	---	---	---	---	---
172-----	IVe	---	---	---	---	---
Paiges						
173*:						
Phiferson-----	VIe	---	---	---	---	---
Tassel-----	VIIe	---	---	---	---	---
Rock outcrop---	VIII	---	---	---	---	---
174:						
Phiferson-----	IVe	---	---	---	---	---
Trelona-----	VIe	---	---	---	---	---
175-----	IVe	---	---	---	---	---
Pierre						
176:						
Pierre-----	VIe	---	---	---	---	---
Grummit-----	VIIe	---	---	---	---	---
177-----	IVe	---	---	---	---	---
Recluse, dry						
178:						
Recluse-----	IIIe	IIIe	30	---	---	5.5
Cedak-----	IVe	IIIe	28	---	---	5.0

Table 5.-Land Capability Classes and Yields
Per Acre of Crops and Pasture--Continued

(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		Wheat, winter		Alfalfa hay	
	N	I	N	I	N	I
			Bu	Bu	Tons	Tons
179:						
Recluse-----	IVe	IVe	25	---	---	4.0
Cedak-----	IVe	IVe	20	---	---	3.5
180:						
Rhoame-----	IVs	---	---	---	---	---
Bahl-----	IVs	---	---	---	---	---
181*:	VIII	---	---	---	---	---
Rock outcrop						
182:						
Rock outcrop---	VIII	---	---	---	---	---
Tassel-----	VIIe	---	---	---	---	---
183:	VIIe	---	---	---	---	---
Samday						
184:						
Samday-----	VIIe	---	---	---	---	---
Pierre-----	VIe	---	---	---	---	---
185*:						
Samday-----	VIIe	---	---	---	---	---
Savageton-----	IVe	---	---	---	---	---
Bahl-----	IVe	---	---	---	---	---
186:						
Savageton-----	IVe	---	---	---	---	---
Bahl-----	IVe	---	---	---	---	---
187:						
Schamber-----	VIIs	---	---	---	---	---
Tulloch-----	VIe	---	---	---	---	---
188:	IVe	---	---	---	---	---
Senlar						
189:						
Shingle-----	VIIe	---	---	---	---	---
Rock outcrop---	VIII	---	---	---	---	---
Samday-----	VIIe	---	---	---	---	---

Table 5.-Land Capability Classes and Yields
Per Acre of Crops and Pasture--Continued

(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		Wheat, winter		Alfalfa hay	
	N	I	N	I	N	I
			Bu	Bu	Tons	Tons
190----- Silhouette	IVe	---	---	---	---	---
191: Skilak-----	IVe	---	---	---	---	---
Kishona-----	IVe	---	---	---	---	---
192*: Sunup-----	VIIe	---	---	---	---	---
Rock outcrop---	VIII	---	---	---	---	---
193: Taluca, cool---	VIIe	---	---	---	---	---
Keeline-----	VIe	---	---	---	---	---
194: Taluca-----	VIIe	---	---	---	---	---
Rock outcrop---	VIII	---	---	---	---	---
Shingle-----	VIIe	---	---	---	---	---
195: Taluca-----	VIIe	---	---	---	---	---
Rock outcrop---	VIII	---	---	---	---	---
Turnercrest---	VIe	---	---	---	---	---
196: Taluca-----	VIIe	---	---	---	---	---
Shingle-----	VIIe	---	---	---	---	---
197*: Taluca-----	VIIe	---	---	---	---	---
Tulloch-----	VIe	---	---	---	---	---
Rock outcrop---	VIII	---	---	---	---	---
198: Taluca-----	VIIe	---	---	---	---	---
Turnercrest---	VIe	---	---	---	---	---
Keeline-----	VIe	---	---	---	---	---

Table 5.-Land Capability Classes and Yields
Per Acre of Crops and Pasture--Continued

(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		Wheat, winter		Alfalfa hay	
	N	I	N	I	N	I
			Bu	Bu	Tons	Tons
199*:						
Tassel-----	VIIE	---	---	---	---	---
Ponderosa-----	VIIE	---	---	---	---	---
Rock outcrop---	VIII	---	---	---	---	---
200:						
Tassel-----	VIIE	---	---	---	---	---
Trelona-----	VIe	---	---	---	---	---
Phiferon-----	IVe	---	---	---	---	---
201:						
Terro-----	IVe	---	---	---	---	---
Turnercrest---	IVe	---	---	---	---	---
202:						
Terro-----	IVe	---	---	---	---	---
Vonalee-----	IVe	---	---	---	---	---
203*:						
Terro-----	VIe	---	---	---	---	---
Vonalee-----	IVe	---	---	---	---	---
Taluce-----	VIIE	---	---	---	---	---
204, 205:						
Theedle-----	IVe	---	---	---	---	---
Kishona-----	IVe	---	---	---	---	---
206:						
Theedle-----	VIe	---	---	---	---	---
Kishona-----	VIe	---	---	---	---	---
Shingle-----	VIIE	---	---	---	---	---
207-----	IVe	---	---	---	---	---
Thirtynine						
208:						
Thirtynine-----	IVe	---	---	---	---	---
Kadoka-----	IVe	---	---	---	---	---

Table 5.-Land Capability Classes and Yields
Per Acre of Crops and Pasture--Continued

(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		Wheat, winter		Alfalfa hay	
	N	I	N	I	N	I
			Bu	Bu	Tons	Tons
209:						
Threetop-----	IVe	---	---	---	---	---
Sunup-----	VIIe	---	---	---	---	---
210:						
Torrington----	IVe	IIIe	25	---	---	3.5
Julesburg----	IIIe	IIIe	30	---	---	5.0
211:-----	VIIe	---	---	---	---	---
Torriorthents--						
212:						
Trelona-----	VIIe	---	---	---	---	---
Phiferson-----	VIe	---	---	---	---	---
Vetal-----	IVe	---	---	---	---	---
213:-----	IVe	---	---	---	---	---
Ulm						
214:						
Ulm-----	IVe	---	---	---	---	---
Bidman-----	IVe	---	---	---	---	---
215:						
Ulm-----	IVe	---	---	---	---	---
Forkwood-----	IVe	---	---	---	---	---
216:-----	VIIe	---	---	---	---	---
Ustic Torriorthents-						
217*:						
Ustic Torriorthents-	VIIe	---	---	---	---	---
Torriorthentic Haplustolls---	VIIe	---	---	---	---	---
Rock outcrop---	VIII	---	---	---	---	---
218:-----	IIIe	IIIe	34	---	---	5.5
Vetal						
219:-----	IVe	IVe	25	---	---	4.0
Vetal						

Table 5.-Land Capability Classes and Yields
Per Acre of Crops and Pasture--Continued

(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		Wheat, winter		Alfalfa hay	
	N	I	N	I	N	I
			Bu	Bu	Tons	Tons
220:						
Vetal-----	IIIe	IIIe	34	---	---	5.5
Phiferson-----	IVe	IVe	20	---	---	3.5
221:						
Vetal-----	IVe	---	---	---	---	---
Phiferson-----	IVe	---	---	---	---	---
222-----	IVe	---	---	---	---	---
Vonalee						
223:						
Vonalee-----	IVe	---	---	---	---	---
Keeline-----	IVe	---	---	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 6.-Soil Pesticide Loss Potential

(Absence of an entry indicates that the map unit component was not rated.)

Soil Name and Map Symbol	Pesticide Loss Potential - Leaching	Pesticide Loss Potential - Runoff
100:		
Absted -----	Slight-----	Slight.
Arvada -----	Slight-----	Slight.
101:		
Absted -----	Slight-----	Slight.
Cambria -----	Moderate: low adsorption.	Slight.
102:		
Albinas -----	Moderate: low adsorption.	Moderate: runoff.
Recluse -----	Slight-----	Moderate: runoff.
103:		
Alice -----	Slight-----	Moderate: runoff.
Manter -----	Slight-----	Moderate: runoff.
104:		
Alice -----	Slight-----	Moderate: runoff.
Phiferon -----	* Slight-----	Moderate: runoff.
105-----		
Badland		
106-----	Slight-----	Moderate: runoff.
Bahl		
107:		
Bahl -----	Slight-----	Slight.
Petrie -----	Slight-----	Slight.
108-----	Moderate: low adsorption.	Slight.
Bayard		
109:		
Bidman -----	Slight-----	Slight.
Slickspots-----		
110:		
Brownrigg -----	* Slight-----	Severe: runoff.
Featherlegs -----	Moderate: poor filter.	Severe: runoff.
Wolf -----	Severe: poor filter.	Severe: runoff.

Table 6.-Soil Pesticide Loss Potential--Continued

(Absence of an entry indicates that the map unit component was not rated.)

Soil Name and Map Symbol	Pesticide Loss Potential - Leaching	Pesticide Loss Potential - Runoff
111: Bumbob -----	Slight-----	Moderate: runoff.
Rhoame -----	Slight-----	Moderate: runoff.
112: Busher -----	Slight-----	Moderate: runoff.
Phiferson -----	* Slight-----	Moderate: runoff.
113----- Cadoma	* Slight-----	Moderate: runoff.
114: Cedak -----	* Slight-----	Moderate: runoff.
Trelona -----	* Slight-----	Moderate: runoff.
115----- Clarkelen, overflow	Slight-----	Slight.
116: Clarkelen -----	Moderate: low adsorption.	Slight.
Draknab -----	Severe: poor filter.	Slight.
Dwyer -----	Severe: poor filter.	Slight.
117----- Coaliams	Moderate: low adsorption.	Moderate: runoff.
118: Cushman -----	* Slight-----	Moderate: runoff.
Forkwood -----	Slight-----	Moderate: runoff.
119: Dailey -----	Severe: poor filter.	Slight.
Orpha, moist -----	Severe: poor filter.	Slight.
120----- Draknab	Severe: poor filter.	Slight.
121: Endoaquolls-----		
Torrifluvents-----		

Table 6.-Soil Pesticide Loss Potential--Continued

(Absence of an entry indicates that the map unit component was not rated.)

Soil Name and Map Symbol	Pesticide Loss Potential - Leaching	Pesticide Loss Potential - Runoff
122: Epping -----	Moderate: seepage.	Severe: runoff.
Badland-----		
123: Featherlegs -----	Moderate: poor filter.	Slight.
Wolf -----	Severe: poor filter.	Moderate: runoff.
124: Featherlegs -----	Moderate: poor filter.	Moderate: runoff.
Wolf -----	Severe: poor filter.	Moderate: runoff.
125: Featherlegs -----	Moderate: poor filter.	Moderate: runoff.
Wolf -----	Severe: poor filter.	Moderate: runoff.
Brownrigg -----	* Slight-----	Moderate: runoff.
126: Forkwood -----	Slight-----	Moderate: runoff.
Cambria -----	Moderate: low adsorption.	Moderate: runoff.
127: Forkwood -----	Moderate: low adsorption.	Moderate: runoff.
Cambria -----	Moderate: low adsorption.	Moderate: runoff.
Cushman -----	* Slight-----	Moderate: runoff.
128: Forkwood -----	Slight-----	Moderate: runoff.
Cushman -----	* Slight-----	Moderate: runoff.
Terro -----	* Slight-----	Moderate: runoff.
129: Grummit, cool -----	* Slight-----	Severe: runoff.
Rock outcrop -----		

Table 6.-Soil Pesticide Loss Potential--Continued

(Absence of an entry indicates that the map unit component was not rated.)

Soil Name and Map Symbol	Pesticide Loss Potential - Leaching	Pesticide Loss Potential - Runoff
130: Grummit -----	* Slight-----	Severe: runoff.
Rock outcrop-----		
131: Grummit -----	* Slight-----	Severe: runoff.
Hilight -----	* Slight-----	Severe: runoff.
132: Grummit -----	* Slight-----	Severe: runoff.
Hilight -----	* Slight-----	Severe: runoff.
Rock outcrop-----		
133: Hargreave -----	* Slight-----	Moderate: runoff.
133: Cedak -----	* Slight-----	Moderate: runoff.
134: Hargreave -----	* Slight-----	Moderate: runoff.
Lambman -----	* Slight-----	Moderate: runoff.
135: Hargreave -----	* Slight-----	Moderate: runoff.
Noden -----	Slight-----	Moderate: runoff.
136----- Haverdad, overflow	Slight-----	Moderate: runoff.
137: Haverdad -----	Slight-----	Slight.
Clarkelen -----	Moderate: low adsorption.	Slight.
138: Haverdad, saline -----	Slight-----	Slight.
Clarkelen, saline -----	Severe: poor filter.	Slight.
139----- Hiland	Slight-----	Moderate: runoff.

Table 6.-Soil Pesticide Loss Potential--Continued

(Absence of an entry indicates that the map unit component was not rated.)

Soil Name and Map Symbol	Pesticide Loss Potential - Leaching	Pesticide Loss Potential - Runoff
140:		
Hiland -----	Slight-----	Moderate: runoff.
Bowbac -----	* Slight-----	Moderate: runoff.
141:		
Hiland -----	Slight-----	Moderate: runoff.
Bowbac -----	* Slight-----	Moderate: runoff.
142:		
Hilight -----	* Slight-----	Severe: runoff.
Rock outcrop-----		
143:		
Hilight -----	* Slight-----	Severe: runoff.
Savageton -----	* Slight-----	Moderate: runoff.
144:		
Jayem -----	Slight-----	Moderate: runoff.
Julesburg -----	Moderate: poor filter.	Moderate: runoff.
145:		
Jayem -----	Slight-----	Moderate: runoff.
Julesburg -----	Slight-----	Moderate: runoff.
146:		
Jayem -----	Slight-----	Moderate: runoff.
Phiferon -----	* Slight-----	Moderate: runoff.
Trelona -----	* Slight-----	Moderate: runoff.
147-----		
Keeline	Slight-----	Moderate: runoff.
148-----		
Keeline	Moderate: low adsorption.	Moderate: runoff.
149:		
Keeline -----	Moderate: low adsorption.	Moderate: runoff.

Table 6.-Soil Pesticide Loss Potential--Continued

(Absence of an entry indicates that the map unit component was not rated.)

Soil Name and Map Symbol	Pesticide Loss Potential - Leaching	Pesticide Loss Potential - Runoff
149: (cont.)		
Kishona -----	Slight-----	Moderate: runoff.
150:		
Keeline -----	Slight-----	Moderate: runoff.
Kishona -----	Slight-----	Severe: runoff.
Theedle -----	* Slight-----	Severe: runoff.
151:		
Keyner -----	Slight-----	Moderate: runoff.
Slickspots-----		
152-----	Slight-----	Moderate: runoff.
Kishona, sodic		
153:		
Kishona -----	Slight-----	Moderate: runoff.
Cambria -----	Slight-----	Moderate: runoff.
154:		
Kishona -----	Slight-----	Moderate: runoff.
154:		
Cambria -----	Slight-----	Moderate: runoff.
Theedle -----	* Slight-----	Moderate: runoff.
155-----	Severe: wetness.	Slight.
Las Animas		
156:		
Lithic Maplustolls-----		
Rock outcrop-----		
157:		
Lithic Maplustolls-----		
Rock outcrop-----		
158-----	Slight-----	Slight.
Lohmiller		
159:		
Lohmiller, saline -----	Slight-----	Moderate: runoff.

Table 6.-Soil Pesticide Loss Potential--Continued

(Absence of an entry indicates that the map unit component was not rated.)

Soil Name and Map Symbol	Pesticide Loss Potential - Leaching	Pesticide Loss Potential - Runoff
159: (cont.) Haverdad, saline -----	Slight-----	Moderate: runoff.
160----- Manzanola	Slight-----	Moderate: runoff.
161----- Minnequa	* Slight-----	Moderate: runoff.
162: Minnequa -----	* Slight-----	Severe: runoff.
Midway -----	* Slight-----	Severe: runoff.
163----- Moskee	Slight-----	Slight.
164: Moskee -----	Slight-----	Moderate: runoff.
Manter -----	Slight-----	Moderate: runoff.
165: Moskee, dry -----	Slight-----	Moderate: runoff.
Manter, dry -----	Slight-----	Moderate: runoff.
166----- Noden	Slight-----	Slight.
167: Orella -----	* Slight-----	Severe: runoff.
Cadoma -----	* Slight-----	Moderate: runoff.
Rock outcrop-----		
168: Orpha, moist -----	Severe: poor filter.	Moderate: runoff.
Dailey -----	Severe: poor filter.	Moderate: runoff.
169: Orpha -----	Severe: poor filter.	Slight.
Dwyer -----	Severe: poor filter.	Slight.

Table 6.-Soil Pesticide Loss Potential--Continued

(Absence of an entry indicates that the map unit component was not rated.)

Soil Name and Map Symbol	Pesticide Loss Potential - Leaching	Pesticide Loss Potential - Runoff
170:		
Orpha -----	Severe: poor filter.	Moderate: runoff.
Dwyer -----	Severe: poor filter.	Moderate: runoff.
Taluce -----	* Severe: poor filter.	Moderate: runoff.
171:		
Oxyaquic Torrifluvents-----		
172-----	* Slight-----	Moderate: runoff.
Paiges -----		
173:		
Phiferson -----	* Slight-----	Severe: runoff.
Tassel -----	* Slight-----	Severe: runoff.
Rock outcrop-----		
174:		
Phiferson -----	* Slight-----	Moderate: runoff.
Trelona -----	* Slight-----	Moderate: runoff.
175-----	* Slight-----	Severe: runoff.
Pierre -----		
176:		
Pierre -----	* Slight-----	Severe: runoff.
Grummit -----	* Slight-----	Severe: runoff.
177-----	Slight-----	Moderate: runoff.
Recluse, dry		
178:		
Recluse -----	Slight-----	Moderate: runoff.
Cedak -----	* Slight-----	Moderate: runoff.
179:		
Recluse -----	Slight-----	Moderate: runoff.
Cedak -----	* Slight-----	Moderate: runoff.

Table 6.-Soil Pesticide Loss Potential--Continued

(Absence of an entry indicates that the map unit component was not rated.)

Soil Name and Map Symbol	Pesticide Loss Potential - Leaching	Pesticide Loss Potential - Runoff
180:		
Rhoame -----	Slight-----	Moderate: runoff.
Bahl -----	Slight-----	Moderate: runoff.
181-----		
Rock outcrop		
182:		
Rock outcrop-----		
Tassel -----	* Slight-----	Severe: runoff.
183-----		
Samday -----	* Slight-----	Severe: runoff.
184:		
Samday -----	* Slight-----	Severe: runoff.
Pierre -----	* Slight-----	Severe: runoff.
185:		
Samday -----	* Slight-----	Severe: runoff.
Savageton -----	* Slight-----	Moderate: runoff.
Bahl -----	Slight-----	Moderate: runoff.
186:		
Savageton -----	* Slight-----	Moderate: runoff.
Bahl -----	Slight-----	Moderate: runoff.
187:		
Schamber -----	Severe: poor filter.	Moderate: runoff.
Tullock -----	* Severe: poor filter.	Severe: runoff.
188-----		
Senlar	Slight-----	Slight.
189:		
Shingle -----	* Slight-----	Severe: runoff.
Rock outcrop-----		
Samday -----	* Slight-----	Severe: runoff.

Table 6.-Soil Pesticide Loss Potential--Continued

(Absence of an entry indicates that the map unit component was not rated.)

Soil Name and Map Symbol	Pesticide Loss Potential - Leaching	Pesticide Loss Potential - Runoff
190----- Silhouette	Moderate: low adsorption.	Moderate: runoff.
191: Skilak -----	Slight-----	Moderate: runoff.
191: Kishona -----	Slight-----	Moderate: runoff.
192: Sunup -----	* Slight-----	Severe: runoff.
Rock outcrop-----		
193: Taluca, cool -----	* Slight-----	Severe: runoff.
Keeline -----	Slight-----	Moderate: runoff.
194: Taluca -----	* Severe: poor filter.	Severe: runoff.
Rock outcrop-----		
Shingle -----	* Slight-----	Severe: runoff.
195: Taluca -----	* Severe: poor filter.	Severe: runoff.
Rock outcrop-----		
Turnercrest -----	* Slight-----	Severe: runoff.
196: Taluca -----	* Severe: poor filter.	Moderate: runoff.
Shingle -----	* Slight-----	Severe: runoff.
197: Taluca -----	* Severe: poor filter.	Severe: runoff.
Tulloch -----	* Severe: poor filter.	Severe: runoff.
Rock outcrop-----		
198: Taluca -----	* Severe: poor filter.	Moderate: runoff.

Table 6.-Soil Pesticide Loss Potential--Continued

(Absence of an entry indicates that the map unit component was not rated.)

Soil Name and Map Symbol	Pesticide Loss Potential - Leaching	Pesticide Loss Potential - Runoff
198: (cont.)		
Turnercrest -----	* Slight-----	Moderate: runoff.
Keeline -----	Moderate: low adsorption.	Moderate: runoff.
199:		
Tassel -----	* Slight-----	Severe: runoff.
Ponderosa -----	Slight-----	Severe: runoff.
Rock outcrop-----		
200:		
Tassel -----	* Slight-----	Severe: runoff.
Trelona -----	* Slight-----	Moderate: runoff.
Phiferon -----	* Slight-----	Moderate: runoff.
201:		
Terro -----	* Slight-----	Moderate: runoff.
201:		
Turnercrest -----	* Slight-----	Moderate: runoff.
202:		
Terro -----	* Slight-----	Moderate: runoff.
Vonalee -----	Moderate: poor filter.	Moderate: runoff.
203:		
Terro -----	* Slight-----	Moderate: runoff.
Vonalee -----	Moderate: low adsorption.	Moderate: runoff.
Taluca -----	* Severe: poor filter.	Severe: runoff.
204:		
Theedle -----	* Slight-----	Moderate: runoff.
Kishona -----	Slight-----	Moderate: runoff.
205:		
Theedle -----	* Slight-----	Moderate: runoff.

Table 6.-Soil Pesticide Loss Potential--Continued

(Absence of an entry indicates that the map unit component was not rated.)

Soil Name and Map Symbol	Pesticide Loss Potential - Leaching	Pesticide Loss Potential - Runoff
205: (cont.)		
Kishona -----	Slight-----	Moderate: runoff.
206:		
Theedle -----	* Slight-----	Moderate: runoff.
Kishona -----	Slight-----	Moderate: runoff.
Shingle -----	* Slight-----	Severe: runoff.
207-----		
Thirtynine	Slight-----	Moderate: runoff.
208:		
Thirtynine -----	Slight-----	Moderate: runoff.
Kadoka -----	* Slight-----	Moderate: runoff.
209:		
Threetop -----	* Slight-----	Moderate: runoff.
Sunup -----	* Slight-----	Moderate: runoff.
210:		
Torrington -----	* Severe: poor filter.	Moderate: runoff.
Julesburg -----	Moderate: poor filter.	Moderate: runoff.
211.-----		
Torriorthents		
212:		
Trelona -----	* Slight-----	Severe: runoff.
Phiferson -----	* Slight-----	Moderate: runoff.
Vetal -----	Slight-----	Moderate: runoff.
213-----		
Ulm	Slight-----	Moderate: runoff.
214:		
Ulm -----	Slight-----	Moderate: runoff.
214:		
Bidman -----	Slight-----	Moderate: runoff.

Table 6.-Soil Pesticide Loss Potential--Continued

(Absence of an entry indicates that the map unit component was not rated.)

Soil Name and Map Symbol	Pesticide Loss Potential - Leaching	Pesticide Loss Potential - Runoff
215: Ulm -----	Slight-----	Moderate: runoff.
Forkwood -----	Moderate: low adsorption.	Moderate: runoff.
216----- Ustic Torriorthents		
217: Ustic Torriorthents, cool-----		
Torriorthentic Maplustolls-----		
Rock outcrop-----		
218----- Vetal	Slight-----	Slight.
219----- Vetal	Slight-----	Moderate: runoff.
220: Vetal -----	Slight-----	Moderate: runoff.
Phiferson -----	* Slight-----	Moderate: runoff.
221: Vetal -----	Slight-----	Moderate: runoff.
Phiferson -----	* Slight-----	Moderate: runoff.
222----- Vonalee	Moderate: poor filter.	Moderate: runoff.
223: Vonalee -----	Slight-----	Moderate: runoff.
Keeline -----	Moderate: low adsorption.	Moderate: runoff.

* Bedrock permeability criteria was not evaluated due to unavailable bedrock permeability data.

Table 7.--Rangeland Productivity and Characteristic Plant Communities

(Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
		Lb/acre		Pct	
100*:					
Absted-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	25
		Normal	1,200	Needleandthread-----	15
		Unfavorable	700	Blue grama-----	10
				Green needlegrass-----	10
				Big sagebrush-----	5
				Greasewood-----	5
Arvada-----	Saline Upland, 10 To 14 Northern Plains.	Favorable	650	Inland saltgrass-----	15
		Normal	500	Sandberg bluegrass-----	10
		Unfavorable	250	Western wheatgrass-----	10
				Alkali sacaton-----	10
				Greasewood-----	10
				Gardner saltbush-----	10
101*:					
Absted-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	25
		Normal	1,200	Needleandthread-----	15
		Unfavorable	700	Blue grama-----	10
				Green needlegrass-----	10
				Big sagebrush-----	5
				Greasewood-----	5
Cambria-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	25
		Normal	1,200	Needleandthread-----	20
		Unfavorable	700	Green needlegrass-----	15
				Blue grama-----	10
				Big sagebrush-----	5
				Indian ricegrass-----	5
102*:					
Albinas-----	Loamy, 15 To 17 Southern Plains.	Favorable	1,900	Needleandthread-----	35
		Normal	1,400	Western wheatgrass-----	25
		Unfavorable	700	Blue grama-----	10
				Little bluestem-----	5
				Green needlegrass-----	5
				Prairie junegrass-----	5
				Sandberg bluegrass-----	5
				Big sagebrush-----	5
Recluse-----	Loamy, 15 To 17 Southern Plains.	Favorable	1,900	Needleandthread-----	35
		Normal	1,400	Western wheatgrass-----	20
		Unfavorable	700	Prairie junegrass-----	10
				Blue grama-----	10
				Green needlegrass-----	5
				Big sagebrush-----	5
				Little bluestem-----	5
103*:					
Alice-----	Sandy, 15 To 17 Southern Plains.	Favorable	1,800	Needleandthread-----	35
		Normal	1,400	Little bluestem-----	15
		Unfavorable	800	Prairie sandreed-----	10
				Thickspike wheatgrass-----	10
				Sand dropseed-----	5
				Prairie junegrass-----	5
				Threadleaf sedge-----	5
				Blue grama-----	5
				Silver sagebrush-----	5

Table 7.-Rangeland Productivity and Characteristic Plant Communities--Continued
 (Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
		Lb/acre		Pct	
103*: (cont.)					
Manter-----	Sandy, 15 To 17 Southern Plains.	Favorable	1,800	Needleandthread-----	35
		Normal	1,400	Little bluestem-----	20
		Unfavorable	800	Prairie sandreed-----	15
				Thickspike wheatgrass-----	10
				Sand dropseed-----	5
				Threadleaf sedge-----	5
				Prairie junegrass-----	5
				Silver sagebrush-----	5
104*:					
Alice-----	Sandy, 15 To 17 Southern Plains.	Favorable	1,800	Needleandthread-----	35
		Normal	1,400	Little bluestem-----	15
		Unfavorable	800	Prairie sandreed-----	10
				Thickspike wheatgrass-----	10
				Sand dropseed-----	5
				Prairie junegrass-----	5
				Threadleaf sedge-----	5
				Blue grama-----	5
				Silver sagebrush-----	5
Phifer-son-----	Sandy, 15 To 17 Southern Plains.	Favorable	1,800	Needleandthread-----	35
		Normal	1,400	Prairie sandreed-----	15
		Unfavorable	800	Little bluestem-----	10
				Thickspike wheatgrass-----	10
				Blue grama-----	5
				Threadleaf sedge-----	5
				Silver sagebrush-----	5
				Indian ricegrass-----	5
106-----	Dense Clay, 10 To 14 Northern Plains.	Favorable	1,000	Western wheatgrass-----	50
Bahl		Normal	750	Green needlegrass-----	20
		Unfavorable	450	Buffalograss-----	5
				Sandberg bluegrass-----	5
				Bottlebrush squirreltail-----	5
				Birdfoot sagebrush-----	5
				Greasewood-----	5
107*:					
Bahl-----	Dense Clay, 10 To 14 Northern Plains.	Favorable	1,000	Western wheatgrass-----	50
		Normal	750	Green needlegrass-----	20
		Unfavorable	450	Buffalograss-----	5
				Sandberg bluegrass-----	5
				Bottlebrush squirreltail-----	5
				Birdfoot sagebrush-----	5
				Greasewood-----	5
Petrie-----	Saline Upland, 10 To 14 Northern Plains.	Favorable	650	Gardner saltbush-----	20
		Normal	500	Inland saltgrass-----	15
		Unfavorable	250	Alkali sacaton-----	10
				Squirreltail-----	10
				Western wheatgrass-----	10
				Greasewood-----	5
				Indian ricegrass-----	5
				Sandberg bluegrass-----	5

Table 7.-Rangeland Productivity and Characteristic Plant Communities--Continued

(Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
108----- Bayard	Sandy, 15 To 17 Southern Plains.	Favorable	1,800	Needleandthread-----	30
		Normal	1,400	Little bluestem-----	10
		Unfavorable	800	Prairie sandreed-----	10
				Blue grama-----	5
				Indian ricegrass-----	5
				Threadleaf sedge-----	5
				Prairie junegrass-----	5
				Western wheatgrass-----	5
109*: Bidman-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	25
		Normal	1,200	Needleandthread-----	15
		Unfavorable	700	Blue grama-----	10
				Green needlegrass-----	10
				Big sagebrush-----	5
				Little bluestem-----	5
				Thickspike wheatgrass-----	5
Slickspots-----					
110*: Brownrigg-----	Shallow Loamy, 15 To 17 Southern Plains.	Favorable	1,400	Bluebunch wheatgrass-----	20
		Normal	1,100	Needleandthread-----	15
		Unfavorable	600	Western wheatgrass-----	15
				Blue grama-----	10
				Little bluestem-----	10
				Prairie junegrass-----	5
Featherlegs-----	Loamy, 15 To 17 Southern Plains.	Favorable	1,900	Needleandthread-----	35
		Normal	1,400	Western wheatgrass-----	20
		Unfavorable	700	Blue grama-----	10
				Big sagebrush-----	5
				Little bluestem-----	5
				Winterfat-----	5
Wolf-----	Loamy, 15 To 17 Southern Plains.	Favorable	1,900	Needleandthread-----	35
		Normal	1,400	Western wheatgrass-----	20
		Unfavorable	700	Blue grama-----	10
				Big sagebrush-----	5
				Little bluestem-----	5
111*: Bumbob-----	Clayey, 10 To 14 Northern Plains.	Favorable	1,400	Western wheatgrass-----	40
		Normal	1,000	Green needlegrass-----	20
		Unfavorable	600	Blue grama-----	10
				Silver sagebrush-----	10
				Pricklypear-----	5
				Rabbitbrush-----	5
Rhoame-----	Clayey, 10 To 14 Northern Plains.	Favorable	1,400	Western wheatgrass-----	40
		Normal	1,000	Green needlegrass-----	30
		Unfavorable	600	Blue grama-----	10
				Needleleaf sedge-----	5
				Big sagebrush-----	5

Table 7.-Rangeland Productivity and Characteristic Plant Communities--Continued

(Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
112*:					
Busher-----	Sandy, 15 To 17 Southern Plains.	Favorable	1,800	Needleandthread-----	35
		Normal	1,400	Indian ricegrass-----	10
		Unfavorable	800	Little bluestem-----	10
				Prairie sandreed-----	10
				Thickspike wheatgrass-----	10
				Prairie junegrass-----	5
				Threadleaf sedge-----	5
				Silver sagebrush-----	5
Phifer-son-----	Sandy, 15 To 17 Southern Plains.	Favorable	1,800	Needleandthread-----	35
		Normal	1,400	Prairie sandreed-----	15
		Unfavorable	800	Little bluestem-----	10
				Thickspike wheatgrass-----	10
				Blue grama-----	5
				Threadleaf sedge-----	5
				Silver sagebrush-----	5
				Indian ricegrass-----	5
113-----	Saline Upland, 10 To 14 Northern Plains.	Favorable	650	Inland saltgrass-----	15
Cadoma		Normal	500	Western wheatgrass-----	10
		Unfavorable	250	Greasewood-----	10
				Gardner saltbush-----	10
				Alkali sacaton-----	10
				Sandberg bluegrass-----	10
				Bottlebrush squirreltail-----	5
114*:					
Cedak-----	Loamy, 15 To 17 Southern Plains.	Favorable	1,900	Needleandthread-----	35
		Normal	1,400	Western wheatgrass-----	25
		Unfavorable	700	Blue grama-----	15
				Little bluestem-----	5
				Threadleaf sedge-----	5
				Prairie junegrass-----	5
				Winterfat-----	5
Trelona-----	Shallow Sandy, 15 To 17 Southern Plains.	Favorable	1,500	Little bluestem-----	40
		Normal	1,200	Needleandthread-----	25
		Unfavorable	700	Western wheatgrass-----	10
				Indian ricegrass-----	10
				Threadleaf sedge-----	5
				Blue grama-----	5
115-----	Overflow, 10 To 14 Northern Plains.	Favorable	2,400	Basin wildrye-----	30
Clarkelen, overflow		Normal	1,800	Western wheatgrass-----	20
		Unfavorable	1,200	Green needlegrass-----	15
				Needleandthread-----	5
				Snowberry-----	5
				Silver sagebrush-----	5
				Prairie junegrass-----	5
				Blue grama-----	5
				Canby bluegrass-----	5
116*:					
Clarkelen-----	Lowland, 10 To 14 Northern Plains.	Favorable	3,000	Green needlegrass-----	20
		Normal	2,300	Basin wildrye-----	10
		Unfavorable	1,600	Slender wheatgrass-----	10
				Mat muhly-----	5
				Western wheatgrass-----	5

Table 7.-Rangeland Productivity and Characteristic Plant Communities--Continued
(Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
116*: (cont.)					
Clarkelen-----				Needleandthread-----	5
				Snowberry-----	5
				Silver sagebrush-----	5
				Cottonwood-----	5
				Prairie junegrass-----	5
Draknab-----	Lowland, 10 To 14 Northern Plains.	Favorable	3,000	Green needlegrass-----	15
		Normal	2,300	Needleandthread-----	10
		Unfavorable	1,600	Slender wheatgrass-----	10
				Western wheatgrass-----	10
				Basin wildrye-----	10
				Sandberg bluegrass-----	5
				Prairie junegrass-----	5
				Silver sagebrush-----	5
				Cottonwood-----	5
				Western snowberry-----	5
Dwyer-----	Sands, 10 To 14 Northern Plains.	Favorable	1,700	Prairie sandreed-----	40
		Normal	1,400	Sand bluestem-----	20
		Unfavorable	900	Needleandthread-----	15
				Sandberg bluegrass-----	5
				Silver sagebrush-----	5
				Western wheatgrass-----	5
				Sand dropseed-----	5
117-----	Loamy, 15 To 17 Southern Plains.	Favorable	1,900	Needleandthread-----	35
Coaliams		Normal	1,400	Western wheatgrass-----	25
		Unfavorable	700	Blue grama-----	10
				Little bluestem-----	5
				Green needlegrass-----	5
				Sandberg bluegrass-----	5
				Big sagebrush-----	5
118*:					
Cushman-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	25
		Normal	1,200	Needleandthread-----	20
		Unfavorable	700	Blue grama-----	10
				Green needlegrass-----	10
				Big sagebrush-----	10
				Prairie junegrass-----	5
				Sandberg bluegrass-----	5
Forkwood-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	30
		Normal	1,200	Green needlegrass-----	15
		Unfavorable	700	Needleandthread-----	10
				Blue grama-----	10
				Indian ricegrass-----	5
				Sandberg bluegrass-----	5
				Prairie junegrass-----	5
				Big sagebrush-----	5
119*:					
Dailey-----	Sands, 15 To 17 Southern Plains.	Favorable	2,000	Prairie sandreed-----	35
		Normal	1,500	Sand bluestem-----	30
		Unfavorable	900	Needleandthread-----	10
				Indian ricegrass-----	5
				Western wheatgrass-----	5
				Sand sagebrush-----	5

Table 7.-Rangeland Productivity and Characteristic Plant Communities--Continued

(Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
		Lb/acre		Pct	
119*:(cont.)					
Orpha, moist-----	Sands, 15 To 17 Southern Plains.	Favorable	2,000	Prairie sandreed-----	35
		Normal	1,500	Sand bluestem-----	30
		Unfavorable	900	Needleandthread-----	10
				Indian ricegrass-----	5
				Prairie junegrass-----	5
				Threadleaf sedge-----	5
				Sand sagebrush-----	5
120-----					
Draknab	Lowland, 10 To 14 Northern Plains.	Favorable	3,000	Green needlegrass-----	15
		Normal	2,300	Needleandthread-----	10
		Unfavorable	1,600	Slender wheatgrass-----	10
				Western wheatgrass-----	10
				Basin wildrye-----	10
				Sandberg bluegrass-----	5
				Prairie junegrass-----	5
				Silver sagebrush-----	5
				Cottonwood-----	5
				Western snowberry-----	5
121*:					
Endoaquolls-----	Wetland, 15 To 17 Southern Plains.	Favorable	6,000	Prairie cordgrass-----	45
		Normal	5,500	Bluejoint wheatgrass-----	15
		Unfavorable	4,000	Nebraska sedge-----	15
				Baltic rush-----	5
Torrifluvents-----					
Subirrigated, 15 To 17 Southern Plains.	Favorable	5,000	Big bluestem-----	35	
	Normal	4,500	Indiangrass-----	10	
	Unfavorable	3,500	Little bluestem-----	10	
			Prairie cordgrass-----	5	
			Western wheatgrass-----	5	
122*:					
Epping-----	Shallow Loamy, 10 To 14 Northern Plains.	Favorable	1,200	Western wheatgrass-----	25
		Normal	900	Needleandthread-----	20
		Unfavorable	450	Blue grama-----	20
				Threadleaf sedge-----	10
				Big sagebrush-----	10
Badland-----					
123*, 124*:					
Featherlegs-----	Loamy, 15 To 17 Southern Plains.	Favorable	1,900	Needleandthread-----	35
		Normal	1,400	Western wheatgrass-----	20
		Unfavorable	700	Blue grama-----	10
				Big sagebrush-----	5
				Little bluestem-----	5
				Winterfat-----	5
Wolf-----					
Loamy, 15 To 17 Southern Plains.	Favorable	1,900	Needleandthread-----	35	
	Normal	1,400	Western wheatgrass-----	20	
	Unfavorable	700	Blue grama-----	10	
			Big sagebrush-----	5	
				Little bluestem-----	5

Table 7.-Rangeland Productivity and Characteristic Plant Communities--Continued

(Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
		Lb/acre		Pct	
125*:					
Featherlegs-----	Loamy, 15 To 17 Southern Plains.	Favorable	1,900	Needleandthread-----	35
		Normal	1,400	Western wheatgrass-----	20
		Unfavorable	700	Blue grama-----	10
				Big sagebrush-----	5
				Little bluestem-----	5
				Winterfat-----	5
Wolf-----	Loamy, 15 To 17 Southern Plains.	Favorable	1,900	Needleandthread-----	35
		Normal	1,400	Western wheatgrass-----	20
		Unfavorable	700	Blue grama-----	10
				Big sagebrush-----	5
				Little bluestem-----	5
Brownrigg-----	Shallow Loamy, 15 To 17 Southern Plains.	Favorable	1,400	Bluebunch wheatgrass-----	20
		Normal	1,200	Little bluestem-----	20
		Unfavorable	600	Western wheatgrass-----	15
				Needleandthread-----	10
				Blue grama-----	5
126*:					
Forkwood-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	30
		Normal	1,200	Green needlegrass-----	15
		Unfavorable	700	Needleandthread-----	10
				Blue grama-----	10
				Indian ricegrass-----	5
				Sandberg bluegrass-----	5
				Prairie junegrass-----	5
				Big sagebrush-----	5
Cambria-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	25
		Normal	1,200	Needleandthread-----	20
		Unfavorable	700	Green needlegrass-----	15
				Blue grama-----	10
				Big sagebrush-----	5
				Indian ricegrass-----	5
127*:					
Forkwood-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	30
		Normal	1,200	Green needlegrass-----	15
		Unfavorable	700	Needleandthread-----	10
				Blue grama-----	10
				Indian ricegrass-----	5
				Sandberg bluegrass-----	5
				Prairie junegrass-----	5
				Big sagebrush-----	5
Cambria-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	25
		Normal	1,200	Needleandthread-----	20
		Unfavorable	700	Green needlegrass-----	15
				Blue grama-----	10
				Big sagebrush-----	5
				Indian ricegrass-----	5

Table 7.-Rangeland Productivity and Characteristic Plant Communities--Continued
 (Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
		Lb/acre		Pct	
127*:(cont.)					
Cushman-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	25
		Normal	1,200	Needleandthread-----	20
		Unfavorable	700	Blue grama-----	10
				Green needlegrass-----	10
				Big sagebrush-----	10
				Prairie junegrass-----	5
				Sandberg bluegrass-----	5
128*:					
Forkwood-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	30
		Normal	1,200	Green needlegrass-----	15
		Unfavorable	700	Needleandthread-----	10
				Blue grama-----	10
				Indian ricegrass-----	5
				Sandberg bluegrass-----	5
				Prairie junegrass-----	5
				Big sagebrush-----	5
Cushman-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	25
		Normal	1,200	Needleandthread-----	20
		Unfavorable	700	Blue grama-----	10
				Green needlegrass-----	10
				Big sagebrush-----	10
				Prairie junegrass-----	5
				Sandberg bluegrass-----	5
Terro-----	Sandy, 10 To 14 Northern Plains.	Favorable	1,600	Needleandthread-----	25
		Normal	1,300	Prairie sandreed-----	20
		Unfavorable	750	Indian ricegrass-----	15
				Blue grama-----	10
				Threadleaf sedge-----	10
				Big sagebrush-----	5
130*:					
Grummit-----	Shallow Porous Clay, 10 To 14 Northern Plains.	Favorable	1,000	Little bluestem-----	40
		Normal	750	Western wheatgrass-----	10
		Unfavorable	450	Threadleaf sedge-----	10
				Sand bluestem-----	10
				Blue grama-----	5
				Prairie sandreed-----	5
Rock outcrop-----					
131*:					
Grummit-----	Shallow Clayey, 10 To 14 Northern Plains.	Favorable	1,000	Western wheatgrass-----	30
		Normal	750	Green needlegrass-----	30
		Unfavorable	450	Bluebunch wheatgrass-----	15
				Blue grama-----	5
				Sandberg bluegrass-----	5
				Bottlebrush squirreltail-----	5
				Winterfat-----	5
				Big sagebrush-----	5

Table 7.--Rangeland Productivity and Characteristic Plant Communities--Continued
(Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
		Lb/acre		Pct	
131*: (cont.)					
Hilight-----	Shallow Clayey, 10 To 14 Northern Plains.	Favorable	1,000	Western wheatgrass-----	30
		Normal	750	Green needlegrass-----	30
		Unfavorable	450	Bluebunch wheatgrass-----	10
				Blue grama-----	5
				Big sagebrush-----	5
				Cusick bluegrass-----	5
132*:					
Grummit-----	Shale, 10 To 14 Northern Plains.	Favorable	500	Western wheatgrass-----	30
		Normal	400	Little bluestem-----	15
		Unfavorable	200	Bluebunch wheatgrass-----	10
				Inland saltgrass-----	10
				Blue grama-----	5
				Bottlebrush squirreltail-----	5
				Big sagebrush-----	5
Hilight-----	Shallow Clayey, 10 To 14 Northern Plains.	Favorable	1,000	Western wheatgrass-----	30
		Normal	750	Green needlegrass-----	30
		Unfavorable	450	Bluebunch wheatgrass-----	10
				Blue grama-----	5
				Big sagebrush-----	5
				Cusick bluegrass-----	5
Rock outcrop-----					
133*:					
Hargreave-----	Sandy, 15 To 17 Southern Plains.	Favorable	1,800	Needleandthread-----	35
		Normal	1,400	Prairie sandreed-----	15
		Unfavorable	800	Thickspike wheatgrass-----	10
				Little bluestem-----	10
				Blue grama-----	5
				Threadleaf sedge-----	5
				Silver sagebrush-----	5
Cedak-----	Sandy, 15 To 17 Southern Plains.	Favorable	1,800	Needleandthread-----	35
		Normal	1,400	Little bluestem-----	20
		Unfavorable	800	Prairie sandreed-----	15
				Thickspike wheatgrass-----	10
				Indian ricegrass-----	5
				Silver sagebrush-----	5
134*:					
Hargreave-----	Sandy, 15 To 17 Southern Plains.	Favorable	1,800	Needleandthread-----	35
		Normal	1,400	Prairie sandreed-----	15
		Unfavorable	800	Thickspike wheatgrass-----	10
				Little bluestem-----	10
				Blue grama-----	5
				Threadleaf sedge-----	5
				Silver sagebrush-----	5
Lambman-----	Shallow Loamy, 15 To 17 Southern Plains.	Favorable	1,400	Bluebunch wheatgrass-----	20
		Normal	1,100	Western wheatgrass-----	15
		Unfavorable	600	Little bluestem-----	10
				Needleandthread-----	10
				Blue grama-----	5
				Sandberg bluegrass-----	5
				Threadleaf sedge-----	5
				Fringed sagewort-----	5
				Yucca-----	5

Table 7.-Rangeland Productivity and Characteristic Plant Communities--Continued

(Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
		Lb/acre		Pct	
135*:					
Hargreave-----	Sandy, 15 To 17 Southern Plains.	Favorable	1,800	Needleandthread-----	35
		Normal	1,400	Prairie sandreed-----	15
		Unfavorable	800	Thickspike wheatgrass-----	10
				Little bluestem-----	10
				Blue grama-----	5
				Threadleaf sedge-----	5
				Silver sagebrush-----	5
Noden-----	Sandy, 15 To 17 Southern Plains.	Favorable	1,800	Needleandthread-----	35
		Normal	1,400	Thickspike wheatgrass-----	15
		Unfavorable	800	Prairie sandreed-----	15
				Little bluestem-----	10
				Threadleaf sedge-----	5
				Blue grama-----	5
				Silver sagebrush-----	5
136-----	Overflow, 10 To 14 Northern Plains.	Favorable	2,400	Basin wildrye-----	30
Haverdad, overflow		Normal	1,800	Green needlegrass-----	15
		Unfavorable	1,200	Western wheatgrass-----	15
				Canby bluegrass-----	10
				Silver sagebrush-----	5
				Blue grama-----	5
				Threadleaf sedge-----	5
				Snowberry-----	5
137*:					
Haverdad-----	Lowland, 10 To 14 Northern Plains.	Favorable	3,000	Green needlegrass-----	25
		Normal	2,300	Western wheatgrass-----	15
		Unfavorable	1,600	Slender wheatgrass-----	10
				Basin wildrye-----	10
				Winterfat-----	5
				Needleandthread-----	5
				Silver sagebrush-----	5
Clarkelen-----	Lowland, 10 To 14 Northern Plains.	Favorable	3,000	Green needlegrass-----	20
		Normal	2,300	Basin wildrye-----	10
		Unfavorable	1,600	Slender wheatgrass-----	10
				Mat muhly-----	5
				Western wheatgrass-----	5
				Needleandthread-----	5
				Snowberry-----	5
				Silver sagebrush-----	5
				Cottonwood-----	5
				Prairie junegrass-----	5
138*:					
Haverdad, saline--	Saline Lowland, 10 To 14 Northern Plains.	Favorable	2,200	Alkali sacaton-----	25
		Normal	1,700	Inland saltgrass-----	15
		Unfavorable	1,400	Western wheatgrass-----	10
				Greasewood-----	10
				Bottlebrush squirreltail-----	10
				Basin wildrye-----	5
				Canada wildrye-----	5
				Winterfat-----	5

Table 7.-Rangeland Productivity and Characteristic Plant Communities--Continued

(Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
		Lb/acre		Pct	
138: (cont.)					
Clarkelen, saline-	Saline Lowland, 10 To 14 Northern Plains.	Favorable	2,200	Alkali sacaton-----	25
		Normal	1,700	Greasewood-----	20
		Unfavorable	1,400	Inland saltgrass-----	15
				Western wheatgrass-----	15
				Bottlebrush squirreltail-----	5
				Winterfat-----	5
				Cottonwood-----	5
139-----	Sandy, 10 To 14 Northern Hiland Plains.	Favorable	1,600	Needleandthread-----	25
		Normal	1,300	Prairie sandreed-----	20
		Unfavorable	750	Indian ricegrass-----	15
				Blue grama-----	5
				Sandberg bluegrass-----	5
				Threadleaf sedge-----	5
				Western wheatgrass-----	5
				Silver sagebrush-----	5
140*, 141*:					
Hiland-----	Sandy, 10 To 14 Northern Plains.	Favorable	1,600	Needleandthread-----	25
		Normal	1,300	Prairie sandreed-----	20
		Unfavorable	750	Indian ricegrass-----	15
				Blue grama-----	5
				Sandberg bluegrass-----	5
				Threadleaf sedge-----	5
				Western wheatgrass-----	5
				Silver sagebrush-----	5
Bowbac-----	Sandy, 10 To 14 Northern Plains.	Favorable	1,600	Needleandthread-----	25
		Normal	1,300	Prairie sandreed-----	15
		Unfavorable	750	Indian ricegrass-----	15
				Western wheatgrass-----	10
				Blue grama-----	5
				Threadleaf sedge-----	5
				Prairie junegrass-----	5
				Winterfat-----	5
				Silver sagebrush-----	5
142*:					
Hilight-----	Shallow Clayey, 10 To 14 Northern Plains.	Favorable	1,000	Western wheatgrass-----	30
		Normal	750	Green needlegrass-----	30
		Unfavorable	450	Bluebunch wheatgrass-----	10
				Blue grama-----	5
				Big sagebrush-----	5
				Cusick bluegrass-----	5
Rock outcrop-----					
143*:					
Hilight-----	Shallow Clayey, 10 To 14 Northern Plains.	Favorable	1,000	Western wheatgrass-----	30
		Normal	750	Green needlegrass-----	30
		Unfavorable	450	Bluebunch wheatgrass-----	10
				Blue grama-----	5
				Big sagebrush-----	5
				Cusick bluegrass-----	5

Table 7.-Rangeland Productivity and Characteristic Plant Communities--Continued
 (Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
		Lb/acre		Pct	
143*: (cont.) Savageton-----	Clayey, 10 To 14 Northern Plains.	Favorable	1,400	Western wheatgrass-----	40
		Normal	1,000	Green needlegrass-----	40
		Unfavorable	600	Blue grama-----	10
				Big sagebrush-----	5
144*, 145*: Jayem-----	Sandy, 15 To 17 Southern Plains.	Favorable	1,800	Needleandthread-----	30
		Normal	1,400	Little bluestem-----	15
		Unfavorable	800	Prairie sandreed-----	15
				Indian ricegrass-----	10
				Thickspike wheatgrass-----	10
				Silver sagebrush-----	5
			Sand dropseed-----	5	
			Threadleaf sedge-----	5	
Julesburg-----	Sandy, 15 To 17 Southern Plains.	Favorable	1,800	Needleandthread-----	35
		Normal	1,400	Little bluestem-----	10
		Unfavorable	800	Prairie sandreed-----	10
				Indian ricegrass-----	10
				Thickspike wheatgrass-----	10
				Prairie junegrass-----	5
				Threadleaf sedge-----	5
			Silver sagebrush-----	5	
146*: Jayem-----	Sandy, 15 To 17 Southern Plains.	Favorable	1,800	Needleandthread-----	30
		Normal	1,400	Little bluestem-----	15
		Unfavorable	800	Prairie sandreed-----	15
				Indian ricegrass-----	10
				Thickspike wheatgrass-----	10
				Silver sagebrush-----	5
			Sand dropseed-----	5	
			Threadleaf sedge-----	5	
Phiferon-----	Sandy, 15 To 17 Southern Plains.	Favorable	1,800	Needleandthread-----	35
		Normal	1,400	Prairie sandreed-----	15
		Unfavorable	800	Little bluestem-----	10
				Thickspike wheatgrass-----	10
				Blue grama-----	5
				Threadleaf sedge-----	5
				Silver sagebrush-----	5
			Indian ricegrass-----	5	
Trelona-----	Shallow Sandy, 15 To 17 Southern Plains.	Favorable	1,500	Little bluestem-----	40
		Normal	1,200	Needleandthread-----	25
		Unfavorable	700	Western wheatgrass-----	10
				Indian ricegrass-----	10
			Threadleaf sedge-----	5	
			Blue grama-----	5	
147, 148----- Keeline	Sandy, 10 To 14 Northern Plains.	Favorable	1,600	Needleandthread-----	25
		Normal	1,300	Prairie sandreed-----	10
		Unfavorable	750	Indian ricegrass-----	10
				Western wheatgrass-----	10
				Threadleaf sedge-----	10
				Little bluestem-----	5
				Blue grama-----	5
			Silver sagebrush-----	5	
			Sand dropseed-----	5	

Table 7.--Rangeland Productivity and Characteristic Plant Communities--Continued

(Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
		Lb/acre		Pct	
149*:					
Keeline-----	Sandy, 10 To 14 Northern Plains.	Favorable	1,600	Needleandthread-----	25
		Normal	1,300	Prairie sandreed-----	10
		Unfavorable	750	Indian ricegrass-----	10
				Western wheatgrass-----	10
				Threadleaf sedge-----	10
				Little bluestem-----	5
				Blue grama-----	5
				Silver sagebrush-----	5
				Sand dropseed-----	5
Kishona-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	25
		Normal	1,200	Needleandthread-----	25
		Unfavorable	700	Green needlegrass-----	15
				Blue grama-----	10
				Big sagebrush-----	5
				Cusick bluegrass-----	5
150*:					
Keeline-----	Sandy, 10 To 14 Northern Plains.	Favorable	1,600	Needleandthread-----	25
		Normal	1,300	Prairie sandreed-----	10
		Unfavorable	750	Indian ricegrass-----	10
				Western wheatgrass-----	10
				Threadleaf sedge-----	10
				Little bluestem-----	5
				Blue grama-----	5
				Silver sagebrush-----	5
				Sand dropseed-----	5
Kishona-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	25
		Normal	1,200	Needleandthread-----	25
		Unfavorable	700	Green needlegrass-----	15
				Blue grama-----	10
				Big sagebrush-----	5
				Cusick bluegrass-----	5
Theedle-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	25
		Normal	1,200	Needleandthread-----	25
		Unfavorable	700	Green needlegrass-----	15
				Blue grama-----	10
				Cusick bluegrass-----	5
				Big sagebrush-----	5
151*:					
Keyner-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	25
		Normal	1,200	Needleandthread-----	25
		Unfavorable	700	Blue grama-----	15
				Green needlegrass-----	15
				Big sagebrush-----	10
Slickspots-----					
152-----					
Kishona, sodic	Saline Upland, 10 To 14 Northern Plains.	Favorable	650	Alkali sacaton-----	20
		Normal	500	Western wheatgrass-----	10
		Unfavorable	250	Inland saltgrass-----	10
				Sandberg bluegrass-----	10
				Bottlebrush squirreltail-----	5
				Indian ricegrass-----	5
				Winterfat-----	5
				Greasewood-----	5
				Big sagebrush-----	5

Table 7.-Rangeland Productivity and Characteristic Plant Communities--Continued

(Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
153*:					
Kishona-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	25
		Normal	1,200	Needleandthread-----	25
		Unfavorable	700	Green needlegrass-----	15
				Blue grama-----	10
				Big sagebrush-----	5
				Cusick bluegrass-----	5
Cambria-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	25
		Normal	1,200	Needleandthread-----	20
		Unfavorable	700	Green needlegrass-----	15
				Blue grama-----	10
				Big sagebrush-----	5
				Indian ricegrass-----	5
154*:					
Kishona-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	25
		Normal	1,200	Needleandthread-----	25
		Unfavorable	700	Green needlegrass-----	15
				Blue grama-----	10
				Big sagebrush-----	5
				Cusick bluegrass-----	5
Cambria-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	25
		Normal	1,200	Needleandthread-----	20
		Unfavorable	700	Green needlegrass-----	15
				Blue grama-----	10
				Big sagebrush-----	5
				Indian ricegrass-----	5
Theedle-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	25
		Normal	1,200	Needleandthread-----	25
		Unfavorable	700	Green needlegrass-----	15
				Blue grama-----	10
				Cusick bluegrass-----	5
				Big sagebrush-----	5
155-----	Subirrigated, 15 To 17 Southern Plains.	Favorable	5,000	Little bluestem-----	20
Las Animas		Normal	4,500	Western wheatgrass-----	15
		Unfavorable	3,500	Indiangrass-----	10
				Big bluestem-----	10
				Switchgrass-----	5
				Sedge-----	5
				Prairie cordgrass-----	5
				Slender wheatgrass-----	5
				Plains bluegrass-----	5
				Alkali sacaton-----	5
				Inland saltgrass-----	5
156*:					
Lithic Haplustolls	Shallow Loamy, 15 To 17 Southern Plains.	Favorable	1,400	Bluebunch wheatgrass-----	25
		Normal	1,100	Little bluestem-----	20
		Unfavorable	600	Western wheatgrass-----	15
				Needleandthread-----	10
Rock outcrop-----					

Table 7.-Rangeland Productivity and Characteristic Plant Communities--Continued
(Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
		Lb/acre		Pct	
158----- Lohmiller	Clayey Overflow, 10 To 14 Northern Plains.	Favorable	2,200	Basin wildrye-----	40
		Normal	1,800	Green needlegrass-----	10
		Unfavorable	1,200	Western wheatgrass-----	10
				Canada wildrye-----	5
				Cusick bluegrass-----	5
				Mat muhly-----	5
				Western snowberry-----	5
159*: Lohmiller, saline-	Saline Lowland, 10 To 14 Northern Plains.	Favorable	2,200	Alkali sacaton-----	25
		Normal	1,700	Western wheatgrass-----	15
		Unfavorable	1,400	Inland saltgrass-----	15
				Bottlebrush squirreltail-----	10
				Basin wildrye-----	5
				Greasewood-----	5
				Winterfat-----	5
Haverdad, saline--	Saline Lowland, 10 To 14 Northern Plains.	Favorable	2,200	Alkali sacaton-----	25
		Normal	1,700	Inland saltgrass-----	15
		Unfavorable	1,400	Western wheatgrass-----	10
				Greasewood-----	10
				Bottlebrush squirreltail-----	10
				Basin wildrye-----	5
				Canada wildrye-----	5
				Winterfat-----	5
160----- Manzanola	Clayey, 10 To 14 Northern Plains.	Favorable	1,400	Western wheatgrass-----	40
		Normal	1,100	Green needlegrass-----	40
		Unfavorable	600	Blue grama-----	10
				Big sagebrush-----	5
161----- Minnequa	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	25
		Normal	1,200	Needleandthread-----	20
		Unfavorable	700	Blue grama-----	15
				Green needlegrass-----	10
				Big sagebrush-----	10
				Cusick bluegrass-----	5
				Indian ricegrass-----	5
162*: Minnequa-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	25
		Normal	1,200	Needleandthread-----	20
		Unfavorable	700	Blue grama-----	15
				Green needlegrass-----	10
				Big sagebrush-----	10
				Cusick bluegrass-----	5
				Indian ricegrass-----	5
Midway-----	Shallow Clayey, 10 To 14 Northern Plains.	Favorable	1,000	Western wheatgrass-----	30
		Normal	750	Green needlegrass-----	30
		Unfavorable	450	Bluebunch wheatgrass-----	15
				Big sagebrush-----	5
				Blue grama-----	5
				Prairie junegrass-----	5
				Winterfat-----	5

Table 7.-Rangeland Productivity and Characteristic Plant Communities--Continued

(Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
		Lb/acre		Pct	
163----- Moskee	Sandy, 15 To 17 Southern Plains.	Favorable	1,800	Needleandthread-----	35
		Normal	1,400	Little bluestem-----	15
		Unfavorable	800	Prairie sandreed-----	15
				Thickspike wheatgrass-----	10
				Sandberg bluegrass-----	5
				Threadleaf sedge-----	5
				Silver sagebrush-----	5
		Indian ricegrass-----	5		
164*: Moskee-----	Sandy, 15 To 17 Southern Plains.	Favorable	1,800	Needleandthread-----	35
		Normal	1,400	Little bluestem-----	15
		Unfavorable	800	Prairie sandreed-----	15
				Thickspike wheatgrass-----	10
				Sandberg bluegrass-----	5
				Threadleaf sedge-----	5
				Silver sagebrush-----	5
		Indian ricegrass-----	5		
Manter-----	Sandy, 15 To 17 Southern Plains.	Favorable	1,800	Needleandthread-----	35
		Normal	1,400	Little bluestem-----	20
		Unfavorable	800	Prairie sandreed-----	15
				Thickspike wheatgrass-----	10
				Sand dropseed-----	5
				Threadleaf sedge-----	5
				Prairie junegrass-----	5
		Silver sagebrush-----	5		
165*: Moskee, dry-----	Sandy, 10 To 14 Northern Plains.	Favorable	1,600	Needleandthread-----	25
		Normal	1,300	Prairie sandreed-----	20
		Unfavorable	750	Indian ricegrass-----	15
				Western wheatgrass-----	10
				Little bluestem-----	5
				Sandberg bluegrass-----	5
				Threadleaf sedge-----	5
		Silver sagebrush-----	5		
		Blue grama-----	5		
Manter, dry-----	Sandy, 10 To 14 Northern Plains.	Favorable	1,600	Needleandthread-----	25
		Normal	1,300	Prairie sandreed-----	15
		Unfavorable	750	Indian ricegrass-----	15
				Western wheatgrass-----	10
				Sand dropseed-----	5
				Threadleaf sedge-----	5
				Prairie junegrass-----	5
		Silver sagebrush-----	5		
		Blue grama-----	5		
		Sandberg bluegrass-----	5		
166----- Noden	Sandy, 15 To 17 Southern Plains.	Favorable	1,800	Needleandthread-----	35
		Normal	1,400	Thickspike wheatgrass-----	15
		Unfavorable	800	Prairie sandreed-----	15
				Little bluestem-----	10
				Threadleaf sedge-----	5
		Blue grama-----	5		
		Silver sagebrush-----	5		

Table 7.-Rangeland Productivity and Characteristic Plant Communities--Continued

(Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
167*:					
Orella-----	Saline Upland, 10 To 14 Northern Plains.	Favorable	650	Gardner saltbush-----	15
		Normal	500	Alkali sacaton-----	15
		Unfavorable	250	Inland saltgrass-----	10
				Western wheatgrass-----	10
				Greasewood-----	10
				Sandberg bluegrass-----	10
				Bottlebrush squirreltail-----	5
				Indian ricegrass-----	5
Cadoma-----	Saline Upland, 10 To 14 Northern Plains.	Favorable	650	Inland saltgrass-----	15
		Normal	500	Western wheatgrass-----	10
		Unfavorable	250	Greasewood-----	10
				Gardner saltbush-----	10
				Alkali sacaton-----	10
				Sandberg bluegrass-----	10
				Bottlebrush squirreltail-----	5
Rock outcrop-----					
168*:					
Orpha, moist-----	Sands, 15 To 17 Southern Plains.	Favorable	2,000	Prairie sandreed-----	35
		Normal	1,500	Sand bluestem-----	30
		Unfavorable	900	Needleandthread-----	10
				Indian ricegrass-----	5
				Prairie junegrass-----	5
				Threadleaf sedge-----	5
				Sand sagebrush-----	5
Dailey-----	Sands, 15 To 17 Southern Plains.	Favorable	2,000	Prairie sandreed-----	35
		Normal	1,500	Sand bluestem-----	30
		Unfavorable	900	Needleandthread-----	10
				Indian ricegrass-----	5
				Western wheatgrass-----	5
				Sand sagebrush-----	5
169*:					
Orpha-----	Sands, 10 To 14 Northern Plains.	Favorable	1,700	Prairie sandreed-----	40
		Normal	1,400	Sand bluestem-----	20
		Unfavorable	900	Needleandthread-----	15
				Indian ricegrass-----	10
				Silver sagebrush-----	5
				Threadleaf sedge-----	5
Dwyer-----	Sands, 10 To 14 Northern Plains.	Favorable	1,700	Prairie sandreed-----	40
		Normal	1,400	Sand bluestem-----	20
		Unfavorable	900	Needleandthread-----	15
				Sandberg bluegrass-----	5
				Silver sagebrush-----	5
				Western wheatgrass-----	5
				Sand dropseed-----	5
170*:					
Orpha-----	Sands, 10 To 14 Northern Plains.	Favorable	1,700	Prairie sandreed-----	40
		Normal	1,400	Sand bluestem-----	20
		Unfavorable	900	Needleandthread-----	15
				Indian ricegrass-----	10
				Silver sagebrush-----	5
				Threadleaf sedge-----	5

Table 7.--Rangeland Productivity and Characteristic Plant Communities--Continued

(Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
		Lb/acre		Pct	
170*: (cont.)					
Dwyer-----	Sands, 10 To 14 Northern Plains.	Favorable	1,700	Prairie sandreed-----	40
		Normal	1,400	Sand bluestem-----	20
		Unfavorable	900	Needleandthread-----	15
				Sandberg bluegrass-----	5
				Silver sagebrush-----	5
				Western wheatgrass-----	5
				Sand dropseed-----	5
Taluce-----	Shallow Sandy, 10 To 14 Northern Plains.	Favorable	1,300	Needleandthread-----	25
		Normal	1,000	Prairie sandreed-----	25
		Unfavorable	600	Little bluestem-----	10
				Bluebunch wheatgrass-----	10
				Threadleaf sedge-----	5
				Blue grama-----	5
171-----	Subirrigated, 10 To 14 Northern Plains.	Favorable	4,500	Prairie sandreed-----	25
Oxyaquic		Normal	4,000	Prairie cordgrass-----	20
Torrifluvents		Unfavorable	3,500	Big bluestem-----	10
				Wheatgrass-----	10
172-----	Porous Clay, 10 To 14 Northern Plains.	Favorable	1,550	Prairie sandreed-----	30
Paiges		Normal	1,200	Little bluestem-----	15
		Unfavorable	650	Western wheatgrass-----	10
				Big bluestem-----	5
				Indian ricegrass-----	5
				Silver sagebrush-----	5
				Cudweed sagewort-----	5
				Rubber rabbitbrush-----	5
173*:					
Phiferon-----	Sandy, 15 To 17 Southern Plains.	Favorable	1,800	Needleandthread-----	35
		Normal	1,400	Prairie sandreed-----	15
		Unfavorable	800	Little bluestem-----	10
				Thickspike wheatgrass-----	10
				Blue grama-----	5
				Threadleaf sedge-----	5
				Silver sagebrush-----	5
				Indian ricegrass-----	5
Tassel-----	Shallow Sandy, 15 To 17 Southern Plains.	Favorable	1,500	Little bluestem-----	35
		Normal	1,200	Needleandthread-----	20
		Unfavorable	700	Western wheatgrass-----	10
				Indian ricegrass-----	10
				Threadleaf sedge-----	5
				Yucca-----	5
Rock outcrop-----					
174*:					
Phiferon-----	Sandy, 15 To 17 Southern Plains.	Favorable	1,800	Needleandthread-----	35
		Normal	1,400	Prairie sandreed-----	15
		Unfavorable	800	Little bluestem-----	10
				Thickspike wheatgrass-----	10
				Blue grama-----	5
				Threadleaf sedge-----	5
				Silver sagebrush-----	5
				Indian ricegrass-----	5

Table 7.-Rangeland Productivity and Characteristic Plant Communities--Continued

(Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
		Lb/acre		Pct	
174*: (cont.)					
Trelona-----	Shallow Sandy, 15 To 17 Southern Plains.	Favorable	1,500	Little bluestem-----	40
		Normal	1,200	Needleandthread-----	25
		Unfavorable	700	Western wheatgrass-----	10
				Indian ricegrass-----	10
				Threadleaf sedge-----	5
				Blue grama-----	5
175-----	Clayey, 10 To 14 Northern Plains.	Favorable	1,400	Western wheatgrass-----	40
Pierre		Normal	1,000	Green needlegrass-----	30
		Unfavorable	600	Blue grama-----	10
176*:					
Pierre-----	Clayey, 10 To 14 Northern Plains.	Favorable	1,400	Western wheatgrass-----	40
		Normal	1,000	Green needlegrass-----	30
		Unfavorable	600	Blue grama-----	10
Grummit-----	Shallow Clayey, 10 To 14 Northern Plains.	Favorable	1,000	Western wheatgrass-----	30
		Normal	750	Green needlegrass-----	30
		Unfavorable	450	Bluebunch wheatgrass-----	15
				Blue grama-----	5
				Sandberg bluegrass-----	5
				Bottlebrush squirreltail-----	5
				Winterfat-----	5
				Big sagebrush-----	5
177-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	25
Recluse, dry		Normal	1,200	Needleandthread-----	15
		Unfavorable	700	Blue grama-----	15
				Green needlegrass-----	10
				Prairie junegrass-----	5
				Big sagebrush-----	5
				Mutton bluegrass-----	5
178*, 179*:					
Recluse-----	Loamy, 15 To 17 Southern Plains.	Favorable	1,900	Needleandthread-----	35
		Normal	1,400	Western wheatgrass-----	20
		Unfavorable	700	Blue grama-----	10
				Green needlegrass-----	5
				Prairie junegrass-----	5
				Big sagebrush-----	5
				Little bluestem-----	5
Cedak-----	Loamy, 15 To 17 Southern Plains.	Favorable	1,900	Needleandthread-----	35
		Normal	1,400	Western wheatgrass-----	25
		Unfavorable	700	Blue grama-----	15
				Little bluestem-----	5
				Threadleaf sedge-----	5
				Prairie junegrass-----	5
				Winterfat-----	5
180*:					
Rhoame-----	Clayey, 10 To 14 Northern Plains.	Favorable	1,400	Western wheatgrass-----	40
		Normal	1,000	Green needlegrass-----	30
		Unfavorable	600	Blue grama-----	10
				Needleleaf sedge-----	5
				Big sagebrush-----	5

Table 7.-Rangeland Productivity and Characteristic Plant Communities--Continued
 (Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
		Lb/acre		Pct	
180*:(cont.)					
Bahl-----	Dense Clay, 10 To 14 Northern Plains.	Favorable	1,000	Western wheatgrass-----	50
		Normal	750	Green needlegrass-----	20
		Unfavorable	450	Buffalograss-----	5
				Sandberg bluegrass-----	5
				Bottlebrush squirreltail-----	5
				Birdfoot sagebrush-----	5
				Greasewood-----	5
182*:					
Rock outcrop-----					
Tassel-----	Shallow Sandy, 15 To 17 Southern Plains.	Favorable	1,500	Little bluestem-----	35
		Normal	1,200	Needleandthread-----	20
		Unfavorable	700	Western wheatgrass-----	10
				Indian ricegrass-----	10
				Threadleaf sedge-----	5
				Yucca-----	5
				Ponderosa pine-----	5
183-----	Shallow Clayey, 10 To 14 Northern Plains.	Favorable	1,000	Western wheatgrass-----	30
Samday		Normal	750	Green needlegrass-----	30
		Unfavorable	450	Bluebunch wheatgrass-----	15
				Big sagebrush-----	5
				Blue grama-----	5
				Prairie junegrass-----	5
				Winterfat-----	5
184*:					
Samday-----	Shallow Clayey, 10 To 14 Northern Plains.	Favorable	1,000	Western wheatgrass-----	30
		Normal	750	Green needlegrass-----	30
		Unfavorable	450	Bluebunch wheatgrass-----	15
				Big sagebrush-----	5
				Blue grama-----	5
				Prairie junegrass-----	5
				Winterfat-----	5
Pierre-----	Clayey, 10 To 14 Northern Plains.	Favorable	1,400	Western wheatgrass-----	40
		Normal	1,000	Green needlegrass-----	30
		Unfavorable	600	Blue grama-----	10
185*:					
Samday-----	Shallow Clayey, 10 To 14 Northern Plains.	Favorable	1,000	Western wheatgrass-----	30
		Normal	750	Green needlegrass-----	30
		Unfavorable	450	Bluebunch wheatgrass-----	15
				Big sagebrush-----	5
				Blue grama-----	5
				Prairie junegrass-----	5
				Winterfat-----	5
Savageton-----	Clayey, 10 To 14 Northern Plains.	Favorable	1,400	Western wheatgrass-----	40
		Normal	1,000	Green needlegrass-----	40
		Unfavorable	600	Blue grama-----	10
				Big sagebrush-----	5

Table 7.-Rangeland Productivity and Characteristic Plant Communities--Continued

(Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
		Lb/acre		Pct	
185*:(cont.)					
Bahl-----	Dense Clay, 10 To 14 Northern Plains.	Favorable	1,000	Western wheatgrass-----	50
		Normal	750	Green needlegrass-----	20
		Unfavorable	450	Buffalograss-----	5
				Sandberg bluegrass-----	5
				Bottlebrush squirreltail-----	5
				Birdfoot sagebrush-----	5
				Greasewood-----	5
186*:					
Savageton-----	Clayey, 10 To 14 Northern Plains.	Favorable	1,400	Western wheatgrass-----	40
		Normal	1,000	Green needlegrass-----	40
		Unfavorable	600	Blue grama-----	10
				Big sagebrush-----	5
Bahl-----	Dense Clay, 10 To 14 Northern Plains.	Favorable	1,000	Western wheatgrass-----	50
		Normal	750	Green needlegrass-----	20
		Unfavorable	450	Buffalograss-----	5
				Sandberg bluegrass-----	5
				Bottlebrush squirreltail-----	5
				Birdfoot sagebrush-----	5
				Greasewood-----	5
187*:					
Schamber-----	Shallow Sandy, 10 To 14 Northern Plains.	Favorable	1,300	Little bluestem-----	20
		Normal	1,000	Needleandthread-----	20
		Unfavorable	600	Prairie sandreed-----	15
				Bluebunch wheatgrass-----	10
				Silver sagebrush-----	5
				Blue grama-----	5
				Threadleaf sedge-----	5
Tullock-----	Sands, 10 To 14 Northern Plains.	Favorable	1,700	Prairie sandreed-----	40
		Normal	1,400	Sand bluestem-----	15
		Unfavorable	900	Needleandthread-----	10
				Western wheatgrass-----	5
				Indian ricegrass-----	5
				Blue grama-----	5
				Sand dropseed-----	5
				Silver sagebrush-----	5
188-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	40
Senlar		Normal	1,200	Needleandthread-----	25
		Unfavorable	700	Green needlegrass-----	15
				Blue grama-----	5
				Indian ricegrass-----	5
				Big sagebrush-----	5
189*:					
Shingle-----	Shallow Loamy, 10 To 14 Northern Plains.	Favorable	1,200	Bluebunch wheatgrass-----	40
		Normal	900	Western wheatgrass-----	15
		Unfavorable	450	Needleandthread-----	10
				Blue grama-----	5
				Threadleaf sedge-----	5
				Little bluestem-----	5
				Green needlegrass-----	5
				Big sagebrush-----	5

Table 7.-Rangeland Productivity and Characteristic Plant Communities--Continued

(Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry		
			Lb/acre		
189*:(cont.) Rock outcrop-----					
Samday-----	Shallow Clayey, 10 To 14 Northern Plains.	Favorable Normal Unfavorable	1,000 750 450	Western wheatgrass----- Green needlegrass----- Bluebunch wheatgrass----- Big sagebrush----- Blue grama----- Prairie junegrass----- Winterfat-----	30 30 15 5 5 5 5
190----- Silhouette	Clayey, 10 To 14 Northern Plains.	Favorable Normal Unfavorable	1,400 1,000 600	Western wheatgrass----- Green needlegrass----- Blue grama----- Big sagebrush----- Cusick bluegrass----- Prairie junegrass-----	40 30 10 5 5 5
191*: Skilak-----	Clayey, 10 To 14 Northern Plains.	Favorable Normal Unfavorable	1,400 1,000 600	Western wheatgrass----- Green needlegrass----- Blue grama----- Buffalograss----- Cusick bluegrass----- Big sagebrush-----	35 20 10 5 5 5
Kishona-----	Loamy, 10 To 14 Northern Plains.	Favorable Normal Unfavorable	1,500 1,200 700	Western wheatgrass----- Needleandthread----- Green needlegrass----- Blue grama----- Big sagebrush----- Cusick bluegrass-----	25 25 15 10 5 5
192*: Sunup-----	Very Shallow, 10 To 14 Northern Plains.	Favorable Normal Unfavorable	500 350 250	Bluebunch wheatgrass----- Little bluestem----- Western wheatgrass----- Blue grama----- Cusick bluegrass----- Needleandthread----- Big sagebrush-----	30 30 10 5 5 5 5
Rock outcrop-----					
193*: Taluca, cool-----	Grazeable Woodland, 10 To 14 Northern Plains.	Favorable Normal Unfavorable	800 600 400	Bluebunch wheatgrass----- Little bluestem----- Needleandthread----- Ponderosa pine----- Western wheatgrass----- Prairie sandreed----- Big bluestem----- Threadleaf sedge----- Sideoats grama----- Juniper-----	25 10 10 10 5 5 5 5 5 5

Table 7.-Rangeland Productivity and Characteristic Plant Communities--Continued

(Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry		
		Lb/acre		Pct	
193*:(cont.)					
Keeline-----	Sandy, 10 To 14 Northern Plains.	Favorable	1,600	Needleandthread-----	25
		Normal	1,300	Prairie sandreed-----	10
		Unfavorable	750	Indian ricegrass-----	10
				Western wheatgrass-----	10
				Threadleaf sedge-----	10
				Little bluestem-----	5
				Blue grama-----	5
				Silver sagebrush-----	5
				Sand dropseed-----	5
194*:					
Taluce-----	Shallow Sandy, 10 To 14 Northern Plains.	Favorable	1,300	Needleandthread-----	25
		Normal	1,000	Prairie sandreed-----	25
		Unfavorable	600	Little bluestem-----	10
				Bluebunch wheatgrass-----	10
				Threadleaf sedge-----	5
				Blue grama-----	5
Rock outcrop-----					
Shingle-----	Shallow Loamy, 10 To 14 Northern Plains.	Favorable	1,200	Bluebunch wheatgrass-----	40
		Normal	900	Western wheatgrass-----	15
		Unfavorable	450	Needleandthread-----	10
				Blue grama-----	5
				Threadleaf sedge-----	5
				Little bluestem-----	5
				Green needlegrass-----	5
				Big sagebrush-----	5
195*:					
Taluce-----	Shallow Sandy, 10 To 14 Northern Plains.	Favorable	1,300	Needleandthread-----	25
		Normal	1,000	Prairie sandreed-----	25
		Unfavorable	600	Little bluestem-----	10
				Bluebunch wheatgrass-----	10
				Threadleaf sedge-----	5
				Blue grama-----	5
Rock outcrop-----					
Turnercrest-----	Sandy, 10 To 14 Northern Plains.	Favorable	1,600	Needleandthread-----	25
		Normal	1,300	Prairie sandreed-----	15
		Unfavorable	750	Indian ricegrass-----	10
				Western wheatgrass-----	10
				Threadleaf sedge-----	5
				Blue grama-----	5
				Prairie junegrass-----	5
				Silver sagebrush-----	5
				Little bluestem-----	5
196*:					
Taluce-----	Shallow Sandy, 10 To 14 Northern Plains.	Favorable	1,300	Needleandthread-----	25
		Normal	1,000	Prairie sandreed-----	25
		Unfavorable	600	Little bluestem-----	10
				Bluebunch wheatgrass-----	10
				Threadleaf sedge-----	5
				Blue grama-----	5

Table 7.--Rangeland Productivity and Characteristic Plant Communities--Continued
 (Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
196*:(cont.)					
Shingle-----	Shallow Loamy, 10 To 14 Northern Plains.	Favorable	1,200	Bluebunch wheatgrass-----	40
		Normal	900	Western wheatgrass-----	15
		Unfavorable	450	Needleandthread-----	10
				Blue grama-----	5
				Threadleaf sedge-----	5
				Little bluestem-----	5
				Green needlegrass-----	5
		Big sagebrush-----	5		
197*:					
Taluce-----	Very Shallow, 10 To 14 Northern Plains.	Favorable	500	Bluebunch wheatgrass-----	30
		Normal	350	Needleandthread-----	15
		Unfavorable	250	Little bluestem-----	15
				Prairie sandreed-----	5
				Western wheatgrass-----	5
		Indian ricegrass-----	5		
Tullock-----	Sands, 10 To 14 Northern Plains.	Favorable	1,700	Prairie sandreed-----	40
		Normal	1,400	Sand bluestem-----	15
		Unfavorable	900	Needleandthread-----	10
				Western wheatgrass-----	5
				Indian ricegrass-----	5
				Blue grama-----	5
				Sand dropseed-----	5
		Silver sagebrush-----	5		
Rock outcrop-----					
198*:					
Taluce-----	Shallow Sandy, 10 To 14 Northern Plains.	Favorable	1,300	Needleandthread-----	25
		Normal	1,000	Prairie sandreed-----	25
		Unfavorable	600	Little bluestem-----	10
				Bluebunch wheatgrass-----	10
				Threadleaf sedge-----	5
				Blue grama-----	5
Turnercrest-----	Sandy, 10 To 14 Northern Plains.	Favorable	1,600	Needleandthread-----	25
		Normal	1,300	Prairie sandreed-----	15
		Unfavorable	750	Indian ricegrass-----	10
				Western wheatgrass-----	10
				Threadleaf sedge-----	5
				Blue grama-----	5
				Prairie junegrass-----	5
				Silver sagebrush-----	5
		Little bluestem-----	5		
Keeline-----	Sandy, 10 To 14 Northern Plains.	Favorable	1,600	Needleandthread-----	25
		Normal	1,300	Prairie sandreed-----	10
		Unfavorable	750	Indian ricegrass-----	10
				Western wheatgrass-----	10
				Threadleaf sedge-----	10
				Little bluestem-----	5
				Blue grama-----	5
				Silver sagebrush-----	5
				Sand dropseed-----	5

Table 7.-Rangeland Productivity and Characteristic Plant Communities--Continued

(Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
		Lb/acre		Pct	
199*:					
Tassel-----	Shallow Sandy, 15 To 17 Southern Plains.	Favorable	1,500	Little bluestem-----	35
		Normal	1,200	Needleandthread-----	20
		Unfavorable	700	Western wheatgrass-----	10
				Indian ricegrass-----	10
				Threadleaf sedge-----	5
				Yucca-----	5
				Ponderosa pine-----	5
Ponderosa-----	Sandy, 15 To 17 Southern Plains.	Favorable	1,800	Needleandthread-----	30
		Normal	1,400	Little bluestem-----	15
		Unfavorable	800	Prairie sandreed-----	10
				Threadleaf sedge-----	10
				Thickspike wheatgrass-----	10
				Blue grama-----	5
				Ponderosa pine-----	5
Rock outcrop-----					
200*:					
Tassel-----	Shallow Sandy, 15 To 17 Southern Plains.	Favorable	1,500	Little bluestem-----	35
		Normal	1,200	Needleandthread-----	20
		Unfavorable	700	Western wheatgrass-----	10
				Indian ricegrass-----	10
				Threadleaf sedge-----	5
				Yucca-----	5
Trelona-----	Shallow Sandy, 15 To 17 Southern Plains.	Favorable	1,500	Little bluestem-----	40
		Normal	1,200	Needleandthread-----	25
		Unfavorable	700	Western wheatgrass-----	10
				Indian ricegrass-----	10
				Threadleaf sedge-----	5
				Blue grama-----	5
Phiferson-----	Sandy, 15 To 17 Southern Plains.	Favorable	1,800	Needleandthread-----	35
		Normal	1,400	Prairie sandreed-----	15
		Unfavorable	800	Little bluestem-----	10
				Thickspike wheatgrass-----	10
				Blue grama-----	5
				Threadleaf sedge-----	5
				Silver sagebrush-----	5
				Indian ricegrass-----	5
201*:					
Terro-----	Sandy, 10 To 14 Northern Plains.	Favorable	1,600	Needleandthread-----	25
		Normal	1,300	Prairie sandreed-----	20
		Unfavorable	750	Indian ricegrass-----	15
				Blue grama-----	10
				Threadleaf sedge-----	10
				Big sagebrush-----	5
Turnercrest-----	Sandy, 10 To 14 Northern Plains.	Favorable	1,600	Needleandthread-----	25
		Normal	1,300	Prairie sandreed-----	15
		Unfavorable	750	Indian ricegrass-----	10
				Western wheatgrass-----	10
				Threadleaf sedge-----	5
				Blue grama-----	5
				Prairie junegrass-----	5
				Silver sagebrush-----	5
				Little bluestem-----	5

Table 7.-Rangeland Productivity and Characteristic Plant Communities--Continued

(Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
		Lb/acre		Pct	
202*:					
Terro-----	Sandy, 10 To 14 Northern Plains.	Favorable	1,600	Needleandthread-----	25
		Normal	1,300	Prairie sandreed-----	20
		Unfavorable	750	Indian ricegrass-----	15
				Blue grama-----	10
				Threadleaf sedge-----	10
				Big sagebrush-----	5
Vonalee-----	Sandy, 10 To 14 Northern Plains.	Favorable	1,600	Needleandthread-----	25
		Normal	1,300	Prairie sandreed-----	20
		Unfavorable	750	Indian ricegrass-----	15
				Blue grama-----	10
				Threadleaf sedge-----	10
				Big sagebrush-----	5
203*:					
Terro-----	Sandy, 10 To 14 Northern Plains.	Favorable	1,600	Needleandthread-----	25
		Normal	1,300	Prairie sandreed-----	20
		Unfavorable	750	Indian ricegrass-----	15
				Blue grama-----	10
				Threadleaf sedge-----	10
				Big sagebrush-----	5
Vonalee-----	Sandy, 10 To 14 Northern Plains.	Favorable	1,600	Needleandthread-----	25
		Normal	1,300	Prairie sandreed-----	20
		Unfavorable	750	Indian ricegrass-----	15
				Blue grama-----	10
				Threadleaf sedge-----	10
				Big sagebrush-----	5
Taluce-----	Shallow Sandy, 10 To 14 Northern Plains.	Favorable	1,300	Needleandthread-----	25
		Normal	1,000	Prairie sandreed-----	25
		Unfavorable	600	Little bluestem-----	10
				Bluebunch wheatgrass-----	10
				Threadleaf sedge-----	5
				Blue grama-----	5
204*, 205*:					
Theedle-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	25
		Normal	1,200	Needleandthread-----	25
		Unfavorable	700	Green needlegrass-----	15
				Blue grama-----	10
				Cusick bluegrass-----	5
				Big sagebrush-----	5
Kishona-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	25
		Normal	1,200	Needleandthread-----	25
		Unfavorable	700	Green needlegrass-----	15
				Blue grama-----	10
				Big sagebrush-----	5
				Cusick bluegrass-----	5
206*:					
Theedle-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	25
		Normal	1,200	Needleandthread-----	25
		Unfavorable	700	Green needlegrass-----	15
				Blue grama-----	10
				Cusick bluegrass-----	5
				Big sagebrush-----	5

Table 7.--Rangeland Productivity and Characteristic Plant Communities--Continued

(Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
206*:(cont.)					
Kishona-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	25
		Normal	1,200	Needleandthread-----	25
		Unfavorable	700	Green needlegrass-----	15
				Blue grama-----	10
				Big sagebrush-----	5
				Cusick bluegrass-----	5
Shingle-----	Shallow Loamy, 10 To 14 Northern Plains.	Favorable	1,200	Bluebunch wheatgrass-----	40
		Normal	900	Western wheatgrass-----	15
		Unfavorable	450	Needleandthread-----	10
				Blue grama-----	5
				Threadleaf sedge-----	5
				Little bluestem-----	5
				Green needlegrass-----	5
				Big sagebrush-----	5
207-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	30
Thirtynine		Normal	1,200	Green needlegrass-----	15
		Unfavorable	700	Blue grama-----	10
				Needleandthread-----	10
				Indian ricegrass-----	5
				Cusick bluegrass-----	5
				Big sagebrush-----	5
208*:					
Thirtynine-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	30
		Normal	1,200	Green needlegrass-----	15
		Unfavorable	700	Blue grama-----	10
				Needleandthread-----	10
				Indian ricegrass-----	5
				Cusick bluegrass-----	5
				Big sagebrush-----	5
Kadoka-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	30
		Normal	1,200	Needleandthread-----	15
		Unfavorable	700	Green needlegrass-----	10
				Blue grama-----	10
				Cusick bluegrass-----	5
				Indian ricegrass-----	5
				Big sagebrush-----	5
209*:					
Threetop-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	25
		Normal	1,200	Needleandthread-----	25
		Unfavorable	700	Blue grama-----	15
				Green needlegrass-----	15
				Prairie junegrass-----	5
				Sandberg bluegrass-----	5
				Big sagebrush-----	5

Table 7.-Rangeland Productivity and Characteristic Plant Communities--Continued
 (Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
		Lb/acre		Pct	
209* (cont.)					
Sunup-----	Shallow Sandy, 10 To 14 Northern Plains.	Favorable	1,300	Needleandthread-----	30
		Normal	1,000	Prairie sandreed-----	15
		Unfavorable	600	Little bluestem-----	10
				Threadleaf sedge-----	5
				Sidecoats grama-----	5
				Bluebunch wheatgrass-----	5
				Indian ricegrass-----	5
				Rabbitbrush-----	5
				Skunkbush sumac-----	5
210*:					
Torrington-----	Sandy, 15 To 17 Southern Plains.	Favorable	1,800	Needleandthread-----	35
		Normal	1,400	Little bluestem-----	15
		Unfavorable	800	Prairie sandreed-----	10
				Thickspike wheatgrass-----	10
				Indian ricegrass-----	5
				Silver sagebrush-----	5
Julesburg-----	Sandy, 15 To 17 Southern Plains.	Favorable	1,800	Needleandthread-----	35
		Normal	1,400	Little bluestem-----	10
		Unfavorable	800	Prairie sandreed-----	10
				Indian ricegrass-----	10
				Thickspike wheatgrass-----	10
				Prairie junegrass-----	5
				Threadleaf sedge-----	5
				Silver sagebrush-----	5
212*:					
Trelona-----	Shallow Sandy, 15 To 17 Southern Plains.	Favorable	1,500	Little bluestem-----	40
		Normal	1,200	Needleandthread-----	25
		Unfavorable	700	Western wheatgrass-----	10
				Indian ricegrass-----	10
				Threadleaf sedge-----	5
				Blue grama-----	5
Phiferson-----	Sandy, 15 To 17 Southern Plains.	Favorable	1,800	Needleandthread-----	35
		Normal	1,400	Prairie sandreed-----	15
		Unfavorable	800	Little bluestem-----	10
				Thickspike wheatgrass-----	10
				Blue grama-----	5
				Threadleaf sedge-----	5
				Silver sagebrush-----	5
				Indian ricegrass-----	5
Vetal-----	Sandy, 15 To 17 Southern Plains.	Favorable	1,800	Needleandthread-----	30
		Normal	1,400	Little bluestem-----	15
		Unfavorable	800	Prairie sandreed-----	10
				Thickspike wheatgrass-----	10
				Indian ricegrass-----	5
				Sand bluestem-----	5
				Threadleaf sedge-----	5
				Silver sagebrush-----	5
213-----	Clayey, 10 To 14 Northern Plains.	Favorable	1,400	Green needlegrass-----	30
Ulm		Normal	1,000	Western wheatgrass-----	30
		Unfavorable	600	Blue grama-----	10
				Cusick bluegrass-----	5
				Sandberg bluegrass-----	5
				Big sagebrush-----	5

Table 7.--Rangeland Productivity and Characteristic Plant Communities--Continued

(Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
		Lb/acre		Pct	
214*:					
Ulm-----	Clayey, 10 To 14 Northern Plains.	Favorable	1,400	Green needlegrass-----	30
		Normal	1,000	Western wheatgrass-----	30
		Unfavorable	600	Blue grama-----	10
				Cusick bluegrass-----	5
				Sandberg bluegrass-----	5
				Big sagebrush-----	5
Bidman-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	25
		Normal	1,200	Needleandthread-----	15
		Unfavorable	700	Big sagebrush-----	15
				Blue grama-----	10
				Green needlegrass-----	10
				Little bluestem-----	5
				Thickspike wheatgrass-----	5
215*:					
Ulm-----	Clayey, 10 To 14 Northern Plains.	Favorable	1,400	Green needlegrass-----	30
		Normal	1,000	Western wheatgrass-----	30
		Unfavorable	600	Blue grama-----	10
				Cusick bluegrass-----	5
				Sandberg bluegrass-----	5
				Big sagebrush-----	5
Forkwood-----	Loamy, 10 To 14 Northern Plains.	Favorable	1,500	Western wheatgrass-----	30
		Normal	1,200	Green needlegrass-----	15
		Unfavorable	700	Needleandthread-----	10
				Blue grama-----	10
				Indian ricegrass-----	5
				Sandberg bluegrass-----	5
				Prairie junegrass-----	5
				Big sagebrush-----	5
217*:					
Ustic Torriorthents, cool-----					
Torriorthentic Haplustolls-----	Shallow Sandy, 15 To 17 Southern Plains.	Favorable	1,500	Little bluestem-----	35
		Normal	1,200	Needleandthread-----	20
		Unfavorable	700	Western wheatgrass-----	10
				Indian ricegrass-----	10
Rock outcrop-----					
218, 219-----	Sandy, 15 To 17 Southern Plains.	Favorable	1,800	Needleandthread-----	30
Vetal		Normal	1,400	Little bluestem-----	15
		Unfavorable	800	Prairie sandreed-----	10
				Thickspike wheatgrass-----	10
				Indian ricegrass-----	5
				Sand bluestem-----	5
				Threadleaf sedge-----	5
				Silver sagebrush-----	5

Table 7.-Rangeland Productivity and Characteristic Plant Communities--Continued

(Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
		Lb/acre		Pct	
220*, 221*: Vetal-----	Sandy, 15 To 17 Southern Plains.	Favorable	1,800	Needleandthread-----	30
		Normal	1,400	Little bluestem-----	15
		Unfavorable	800	Prairie sandreed-----	10
				Thickspike wheatgrass-----	10
				Indian ricegrass-----	5
				Sand bluestem-----	5
			Threadleaf sedge-----	5	
			Silver sagebrush-----	5	
Phiferson-----	Sandy, 15 To 17 Southern Plains.	Favorable	1,800	Needleandthread-----	35
		Normal	1,400	Prairie sandreed-----	15
		Unfavorable	800	Little bluestem-----	10
				Thickspike wheatgrass-----	10
				Blue grama-----	5
				Threadleaf sedge-----	5
			Silver sagebrush-----	5	
			Indian ricegrass-----	5	
222----- Vonalee	Sandy, 10 To 14 Northern Plains.	Favorable	1,600	Needleandthread-----	25
		Normal	1,300	Prairie sandreed-----	20
		Unfavorable	750	Indian ricegrass-----	15
				Blue grama-----	10
				Threadleaf sedge-----	10
			Big sagebrush-----	5	
223*: Vonalee-----	Sandy, 10 To 14 Northern Plains.	Favorable	1,600	Needleandthread-----	25
		Normal	1,300	Prairie sandreed-----	20
		Unfavorable	750	Indian ricegrass-----	15
				Blue grama-----	10
				Threadleaf sedge-----	10
			Big sagebrush-----	5	
Keeline-----	Sandy, 10 To 14 Northern Plains.	Favorable	1,600	Needleandthread-----	25
		Normal	1,300	Prairie sandreed-----	10
		Unfavorable	750	Indian ricegrass-----	10
				Western wheatgrass-----	10
				Threadleaf sedge-----	10
				Little bluestem-----	5
				Blue grama-----	5
				Silver sagebrush-----	5
			Sand dropseed-----	5	

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 8.-Expected Heights of Selected Woody Species at Age 20 by Suitability Group

(Dashes indicate that the species is not recommended for planting on the soils in the group.)

Woody Species	Group 1			Group 1K			Group 2		
	Precipitation		Irrigated	Precipitation		Irrigated	Precipitation		Irrigated
	10-14"	15-19"		10-14"	15-19"		10-14"	15-19"	
	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	
Conifers*:									
Austrian pine	--	17	22	--	--	--	**16	19	22
Black Hills spruce	--	**16	22	**15	17	22	**15	18	22
Blue spruce	**12	16	22	--	16	22	**14	18	22
Eastern redcedar	15	18	23	15	17	22	16	19	23
Ponderosa pine	**16	18	23	**16	18	23	**17	19	23
Rocky Mountain juniper	10	14	21	10	14	21	11	15	21
Scotch pine	--	**17	21	--	--	--	**13	18	21
Deciduous trees:									
Boxelder	--	**16	21	--	--	--	**12	18	21
Golden willow	**20	**24	31	**20	**24	31	**20	26	31
Green ash	**14	18	28	**14	17	27	**16	20	28
Hackberry	**14	18	26	**14	17	26	**16	20	26
Honeylocust	15	19	28	15	19	28	**17	21	28
Plains cottonwood	**29	**31	41	**29	31	41	**33	35	41
Russian olive	15	18	24	16	18	24	17	20	24
Siberian crabapple	**11	13	19	--	--	--	**12	15	19
Siberian elm	**20	24	33	**20	24	33	**22	26	30
Shrubs:									
American plum	--	**7	10	--	**7	10	**5	8	10
Basin big sagebrush	--	--	--	--	--	--	--	--	--
Common chokecherry	**7	**7	11	**7	**7	11	**7	7	11
Fourwing saltbush	2	--	--	2	--	--	2	--	--
Golden currant	--	**4	6	--	--	--	**4	**5	6
Greasewood	--	--	--	3	--	--	--	--	--
Lilac	**5	7	10	**5	7	10	**6	8	10
Nanking cherry	**3	5	8	--	--	--	**4	6	8
Peking cotoneaster	**3	5	9	--	--	--	**4	6	9
Redosier dogwood	--	4	8	--	--	--	**4	**5	8
Rubber rabbitbrush	--	--	--	3	--	--	--	--	--
Rugosa rose	2	4	6	--	--	--	3	5	6
Saskatoon serviceberry	--	**4	7	--	--	--	**4	5	7
Siberian peashrub	7	9	14	6	9	14	8	10	14
Silver buffaloberry	--	**7	12	--	**7	12	**6	8	12
Skunkbush sumac	3	5	9	3	5	9	4	6	9
Tatarian honeysuckle	6	8	11	6	8	11	7	9	11
Western sandcherry	2	3	3	--	--	--	2	3	3

Table 8.-Expected Heights of Selected Woody Species at Age 20 by Suitability Group--Continued

(Dashes indicate that the species is not recommended for planting on the soils in the group.)

Woody Species	Group 2K			Group 3			Group 4		
	Precipitation		Irri- gated	Precipitation		Irri- gated	Precipitation		Irri- gated
	10- 14"	15- 19"		10- 14"	15- 19"		10- 14"	15- 19"	
	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.
Conifers*:									
Austrian pine	--	--	--	--	**16	22	--	15	22
Black Hills spruce	**16	19	21	--	**16	22	--	--	20
Blue spruce	**12	18	22	--	16	22	--	--	20
Eastern redcedar	16	19	22	10	13	21	10	12	20
Ponderosa pine	**17	20	23	**14	16	22	**12	15	22
Rocky Mountain juniper	11	16	21	8	10	18	8	10	18
Scotch pine	--	--	--	--	**15	20	--	--	20
Deciduous trees:									
Boxelder	--	--	--	--	--	20	--	--	19
Golden willow	**22	26	31	--	--	29	--	--	29
Green ash	**15	18	27	**13	16	28	**13	15	28
Hackberry	**14	18	26	**14	18	24	**14	18	24
Honeylocust	16	20	28	14	17	26	13	16	26
Plains cottonwood	**31	33	41	--	--	41	--	--	41
Russian olive	17	20	24	13	15	23	11	14	22
Siberian crabapple	--	--	--	--	12	19	--	12	19
Siberian elm	21	23	33	**18	23	33	**17	21	33
Shrubs:									
American plum	--	7	10	--	**7	10	--	**7	10
Basin big sagebrush	--	--	--	4	5	--	--	--	--
Common chokecherry	**7	7	11	**7	**8	11	**7	8	11
Fourwing saltbush	2	--	--	2	--	--	2	--	--
Golden currant	--	--	--	--	**4	6	--	**4	6
Greasewood	4	--	--	--	--	--	--	--	--
Lilac	**6	8	10	**5	7	10	**5	7	10
Nanking cherry	--	--	--	**3	5	8	**3	5	8
Peking cotoneaster	--	--	--	**3	4	8	**3	4	8
Redosier dogwood	--	--	--	--	--	8	--	--	8
Rubber rabbitbrush	--	--	--	--	--	--	2	--	--
Rugosa rose	--	--	--	3	4	6	3	4	6
Saskatoon serviceberry	--	--	--	--	--	5	--	--	5
Siberian peashrub	6	9	14	7	8	12	6	7	12
Silver buffaloberry	**6	8	12	--	**7	11	--	**7	10
Skunkbush sumac	4	6	9	3	5	9	3	5	9
Tatarian honeysuckle	6	8	11	5	7	11	5	7	11
Western sandcherry	--	--	--	2	3	3	2	3	3

Table 8.-Expected Heights of Selected Woody Species at Age 20 by Suitability Group--Continued

(Dashes indicate that the species is not recommended for planting on the soils in the group.)

Woody Species	Group 4C			Group 4CK			Group 4K		
	Precipitation		Irri- gated	Precipitation		Irri- gated	Precipitation		Irri- gated
	10- 14"	15- 19"		10- 14"	15- 19"		10- 14"	15- 19"	
	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.
Conifers*:									
Austrian pine	--	--	22	--	--	--	--	--	--
Black Hills spruce	--	--	20	--	--	19	--	--	19
Blue spruce	--	--	19	--	--	18	--	--	19
Eastern redcedar	8	11	20	8	11	19	9	12	19
Ponderosa pine	**10	12	21	**10	12	20	**12	15	21
Rocky Mountain juniper	8	10	18	--	--	17	--	--	17
Scotch pine	--	--	20	--	--	--	--	--	--
Deciduous trees:									
Boxelder	--	--	19	--	--	--	--	--	--
Golden willow	--	--	29	--	--	27	--	--	27
Green ash	**10	12	25	**10	12	23	**12	14	26
Hackberry	**12	16	23	**11	15	22	**13	17	23
Honeylocust	12	14	24	11	13	22	12	15	24
Plains cottonwood	--	--	41	--	--	39	--	--	39
Russian olive	9	11	22	8	11	21	10	13	21
Siberian crabapple	--	11	19	--	--	--	--	--	--
Siberian elm	**15	19	31	--	**13	29	**15	19	29
Shrubs:									
American plum	--	**7	10	--	6	10	--	--	10
Basin big sagebrush	--	--	--	--	--	--	--	--	--
Common chokecherry	**7	8	11	--	7	11	--	--	11
Fourwing saltbush	2	--	--	2	2	--	2	--	--
Golden currant	--	--	6	--	--	6	--	--	6
Greasewood	--	--	--	--	--	--	--	--	--
Lilac	**4	5	9	**4	5	9	**5	7	10
Nanking cherry	**3	5	8	--	--	--	--	--	--
Peking cotoneaster	--	4	8	--	--	--	--	--	--
Redosier dogwood	--	--	7	--	--	--	--	--	--
Rubber rabbitbrush	2	--	--	2	--	--	--	--	--
Rugosa rose	--	3	5	--	--	--	--	--	--
Saskatoon serviceberry	--	--	5	--	--	--	--	--	--
Siberian peashrub	4	5	12	4	5	11	5	6	11
Silver buffaloberry	--	--	10	--	--	10	--	7	10
Skunkbush sumac	3	4	8	3	4	8	3	5	9
Tatarian honeysuckle	4	6	11	4	6	11	3	5	11
Western sandcherry	--	--	3	--	--	--	--	--	--

Table 8.-Expected Heights of Selected Woody Species at Age 20 by Suitability Group--Continued

(Dashes indicate that the species is not recommended for planting on the soils in the group.)

Woody Species	Group 5			Group 5K			Group 5KK		
	Precipitation		Irrigated	Precipitation		Irrigated	Precipitation		Irrigated
	10-14"	15-19"		10-14"	15-19"		10-14"	15-19"	
	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.
Conifers*:									
Austrian pine	--	**16	22	--	--	--	--	--	--
Black Hills spruce	--	--	20	--	--	20	--	--	19
Blue spruce	--	--	21	--	--	21	--	--	20
Eastern redcedar	10	13	20	8	10	20	7	8	19
Ponderosa pine	**13	15	22	**10	13	22	**8	11	18
Rocky Mountain juniper	8	10	17	8	10	17	7	8	13
Scotch pine	--	**15	20	--	--	--	--	--	--
Deciduous trees:									
Boxelder	--	--	20	--	--	--	--	--	--
Golden willow	--	--	29	--	--	--	--	--	--
Green ash	**12	15	27	**11	13	28	**9	11	22
Hackberry	--	14	24	--	--	25	--	--	20
Honeylocust	12	15	26	11	14	28	9	12	22
Plains cottonwood	--	--	41	--	--	41	--	--	33
Russian olive	11	14	23	9	11	23	8	9	19
Siberian crabapple	--	12	19	--	--	--	--	--	--
Siberian elm	**17	22	33	**16	20	33	**13	16	27
Shrubs:									
American plum	--	**7	10	--	--	10	--	--	8
Basin big sagebrush	4	--	--	3	--	--	3	--	--
Common chokecherry	**6	8	11	--	7	11	6	9	9
Fourwing saltbush	2	--	--	2	2	--	2	--	--
Golden currant	--	--	6	--	--	--	--	--	--
Greasewood	--	--	--	3	--	--	3	--	--
Lilac	**5	6	10	**4	5	10	**4	5	10
Nanking cherry	--	**4	8	--	--	--	--	--	--
Peking cotoneaster	--	**4	8	--	--	--	--	--	--
Redosier dogwood	--	--	8	--	--	--	--	--	--
Rubber rabbitbrush	--	--	--	2	--	--	2	2	--
Rugosa rose	2	3	6	--	--	--	--	--	--
Saskatoon serviceberry	--	--	5	--	--	5	--	--	4
Siberian peashrub	5	6	12	4	6	12	3	5	10
Silver buffaloberry	--	**6	11	--	**6	11	--	**6	10
Skunkbush sumac	3	5	8	3	5	8	3	5	8
Tatarian honeysuckle	5	7	11	4	6	11	4	6	11
Western sandcherry	2	3	3	--	--	--	--	--	--

Table 8.-Expected Heights of Selected Woody Species at Age 20 by Suitability Group--Continued

(Dashes indicate that the species is not recommended for planting on the soils in the group.)

Woody Species	Group 6			Group 6D			Group 6DK		
	Precipitation		Irri- gated	Precipitation		Irri- gated	Precipitation		Irri- gated
	10- 14" Ft.	15- 19" Ft.		10- 14" Ft.	15- 19" Ft.		10- 14" Ft.	15- 19" Ft.	
Conifers*:									
Austrian pine	--	--	13	--	**13	22	--	--	--
Black Hills spruce	--	--	16	--	--	20	--	--	18
Blue spruce	--	--	17	--	--	21	--	--	19
Eastern redcedar	**6	**8	16	8	11	20	7	10	18
Ponderosa pine	**8	**10	18	**11	13	22	**11	13	22
Rocky Mountain juniper	**6	**10	14	8	10	18	8	10	18
Scotch pine	--	**11	16	--	13	20	--	--	--
Deciduous trees:									
Boxelder	--	--	16	--	--	20	--	--	--
Golden willow	--	--	--	--	--	29	--	--	29
Green ash	--	**11	22	**11	14	28	**10	13	25
Hackberry	--	--	19	--	12	25	--	11	23
Honeylocust	--	**11	21	14	17	27	14	17	27
Plains cottonwood	--	--	28	--	--	35	--	--	35
Russian olive	--	**9	18	11	14	24	11	24	24
Siberian crabapple	--	--	15	--	**12	19	--	--	--
Siberian elm	**12	**15	26	17	21	33	17	21	33
Shrubs:									
American plum	--	--	8	--	--	10	--	--	10
Basin big sagebrush	3	4	--	3	4	--	3	4	--
Common chokecherry	--	**6	9	--	**7	11	--	**7	11
Fourwing saltbush	2	2	--	2	2	--	2	--	--
Golden currant	--	--	5	--	--	6	--	--	--
Greasewood	--	--	--	--	--	--	--	--	--
Lilac	--	**4	7	--	**5	9	--	**5	9
Nanking cherry	--	--	6	--	**4	8	--	--	--
Peking cotoneaster	--	--	7	--	**4	8	--	--	--
Redosier dogwood	--	--	6	--	--	7	--	--	--
Rubber rabbitbrush	2	3	--	3	3	--	--	--	--
Rugosa rose	**2	**3	5	2	3	6	--	--	--
Saskatoon serviceberry	--	--	4	--	--	5	--	--	--
Siberian peashrub	**4	**5	9	5	7	12	4	6	11
Silver buffaloberry	--	**4	9	--	**7	11	**7	11	11
Skunkbush sumac	--	--	7	**3	5	8	**3	5	8
Tatarian honeysuckle	--	**5	9	5	7	11	5	7	11
Western sandcherry	--	--	3	--	2	3	--	--	--

Table 8.-Expected Heights of Selected Woody Species at Age 20 by Suitability Group--Continued

(Dashes indicate that the species is not recommended for planting on the soils in the group.)

Woody Species	Group 6G			Group 6GK			Group 6GKK		
	Precipitation		Irri- gated	Precipitation		Irri- gated	Precipitation		Irri- gated
	10- 14"	15- 19"		10- 14"	15- 19"		10- 14"	15- 19"	
	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.
Conifers*:									
Austrian pine	--	--	16	--	--	--	--	--	--
Black Hills spruce	--	--	20	--	--	18	--	--	14
Blue spruce	--	--	21	--	--	19	--	--	15
Eastern redcedar	8	10	20	7	9	18	6	7	14
Ponderosa pine	**10	13	22	**10	13	22	**8	11	17
Rocky Mountain juniper	8	10	18	8	10	18	7	8	14
Scotch pine	--	13	20	--	--	--	--	--	--
Deciduous trees:									
Boxelder	--	--	20	--	--	--	--	--	--
Golden willow	--	--	--	--	--	--	--	--	--
Green ash	--	**13	28	--	12	26	--	10	21
Hackberry	--	--	24	--	--	22	--	--	18
Honeylocust	--	13	26	--	13	26	--	11	21
Plains cottonwood	--	--	35	--	--	35	--	--	28
Russian olive	10	13	23	10	13	23	8	8	18
Siberian crabapple	--	--	19	--	--	--	--	--	--
Siberian elm	**15	20	33	**15	20	33	**13	17	26
Shrubs:									
American plum	--	--	10	--	--	10	--	--	8
Basin big sagebrush	3	4	--	3	4	--	2	3	--
Common chokecherry	--	**7	11	--	**7	11	--	--	9
Fourwing saltbush	2	2	--	2	2	--	2	2	--
Golden currant	--	--	6	--	--	--	--	--	--
Greasewood	--	--	--	--	--	--	--	--	--
Lilac	--	**5	9	--	**5	9	--	**5	9
Nanking cherry	--	--	7	--	--	--	--	--	--
Peking cotoneaster	--	**4	8	--	--	--	--	--	--
Redosier dogwood	--	--	7	--	--	--	--	--	--
Rubber rabbitbrush	2	3	--	2	3	6	2	2	5
Rugosa rose	2	3	6	--	--	--	--	--	--
Saskatoon serviceberry	--	--	5	--	--	--	--	--	--
Siberian peashrub	5	6	12	**4	**5	11	**3	**4	9
Silver buffaloberry	--	**5	11	--	5	11	--	**4	9
Skunkbush sumac	--	3	8	--	3	8	--	3	8
Tatarian honeysuckle	--	6	11	--	6	11	--	6	11
Western sandcherry	--	2	3	--	--	--	--	--	--

Table 8.-Expected Heights of Selected Woody Species at Age 20 by Suitability Group--Continued

(Dashes indicate that the species is not recommended for planting on the soils in the group.)

Woody Species	Group 6K			Group 6KK			Group 7		
	Precipitation		Irri- gated	Precipitation		Irri- gated	Precipitation		Irri- gated
	10- 14"	15- 19"		10- 14"	15- 19"		10- 14"	15- 19"	
	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	
Conifers*:									
Austrian pine	--	--	13	--	--	--	--	**12	22
Black Hills spruce	--	--	14	--	--	15	--	--	20
Blue spruce	--	--	16	--	--	16	--	--	21
Eastern redcedar	**6	**7	15	**5	8	15	**7	9	20
Ponderosa pine	**8	**10	17	**8	10	17	--	**11	22
Rocky Mountain juniper	**6	**10	14	**5	7	14	**6	8	18
Scotch pine	--	--	--	--	--	--	--	**12	20
Deciduous trees:									
Boxelder	--	--	--	--	--	--	--	--	20
Golden willow	--	--	--	--	--	--	--	--	--
Green ash	--	**11	21	--	11	22	--	12	28
Hackberry	--	--	18	--	9	20	--	--	24
Honeylocust	--	**11	21	--	11	21	--	13	26
Plains cottonwood	--	--	28	--	--	28	--	--	30
Russian olive	--	**8	18	--	11	19	--	**13	23
Siberian crabapple	--	--	--	--	--	--	--	--	19
Siberian elm	**12	**15	26	**11	14	25	--	16	29
Shrubs:									
American plum	--	--	8	--	--	7	--	--	10
Basin big sagebrush	3	4	--	2	2	--	--	--	--
Common chokecherry	--	**6	9	--	--	8	--	--	11
Fourwing saltbush	2	2	--	2	2	--	--	--	--
Golden currant	--	--	--	--	--	--	--	--	6
Greasewood	--	--	--	--	--	--	--	--	--
Lilac	--	**4	7	--	**4	8	--	**5	9
Nanking cherry	--	--	--	--	--	--	--	--	7
Peking cotoneaster	--	--	--	--	--	--	--	--	8
Redosier dogwood	--	--	--	--	--	--	--	--	7
Rubber rabbitbrush	2	3	--	2	3	--	**2	3	--
Rugosa rose	--	--	--	--	--	--	**2	3	6
Saskatoon serviceberry	--	--	--	--	--	--	--	--	5
Siberian peashrub	**3	**4	9	--	**4	9	**4	6	12
Silver buffaloberry	--	**4	9	--	**4	9	--	--	11
Skunkbush sumac	--	3	7	--	--	7	--	--	--
Tatarian honeysuckle	--	**5	9	--	**5	8	--	5	11
Western sandcherry	--	--	3	--	--	3	--	2	3

Table 8.-Expected Heights of Selected Woody Species at Age 20 by Suitability Group--Continued

(Dashes indicate that the species is not recommended for planting on the soils in the group.)

Woody Species	Group 9L			Group 9W		
	Precipitation		Irrigated	Precipitation		Irrigated
	10-14"	15-19"		10-14"	15-19"	
	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.
Conifers*:						
Austrian pine	--	--	--	--	--	--
Black Hills spruce	--	--	--	--	--	--
Blue spruce	--	--	--	--	--	--
Eastern redcedar	--	**7	17	--	10	20
Ponderosa pine	**9	11	21	--	--	--
Rocky Mountain juniper	**5	6	15	**7	9	16
Scotch pine	--	--	--	--	--	--
Deciduous trees:						
Boxelder	--	--	--	--	--	--
Golden willow	--	--	--	--	--	--
Green ash	--	**11	24	--	16	27
Hackberry	--	--	--	--	--	--
Honeylocust	--	--	--	14	17	27
Plains cottonwood	--	--	35	--	27	41
Russian olive	8	9	22	13	16	23
Siberian crabapple	8	--	--	--	--	--
Siberian elm	**10	12	26	**10	13	29
Shrubs:						
American plum	--	--	--	--	--	--
Basin big sagebrush	4	--	--	--	--	--
Common chokecherry	--	--	--	--	--	--
Fourwing saltbush	3	--	--	2	2	--
Golden currant	--	--	--	3	4	--
Greasewood	3	--	--	3	2	--
Lilac	--	5	10	**5	6	10
Nanking cherry	--	--	--	--	--	--
Peking cotoneaster	--	--	--	--	--	--
Redosier dogwood	--	--	--	--	--	--
Rubber rabbitbrush	3	--	--	2	3	--
Rugosa rose	--	--	--	--	--	--
Saskatoon serviceberry	--	--	--	--	--	--
Siberian peashrub	4	5	10	5	8	12
Silver buffaloberry	--	5	11	--	7	11
Skunkbush sumac	3	4	9	3	5	9
Tatarian honeysuckle	4	5	11	6	7	11
Western sandcherry	--	--	--	--	--	--

Table 9.-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
100*: Absted-----	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
Arvada-----	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
101*: Absted-----	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
Cambria-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
102*: Albinas-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Recluse-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
103*: Alice-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones.
Manter-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
104*: Alice-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones.
Phiferon-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones.
105*: Badland				
106----- Bahl	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
107*: Bahl-----	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Petrie-----	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

Table 9.-Construction Materials--Continued

(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
108----- Bayard	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
109*: Bidman-----	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Slickspots-----				
110*: Brownrigg-----	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Featherlegs-----	Fair: slope.	Probable-----	Probable-----	Poor: area reclaim, slope.
Wolf-----	Fair: slope.	Probable-----	Probable-----	Poor: area reclaim, slope.
111*: Bumbob-----	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Rhoame-----	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
112*: Busher-----	Fair: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones.
Phiferson-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones.
113----- Cadoma	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
114*: Cedak-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones, thin layer.
Trelona-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
115----- Clarkelen, overflow	Good-----	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.

Table 9.-Construction Materials--Continued

(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
116*: Clarkelen-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
Draknab-----	Good-----	Probable-----	Improbable: too sandy.	Poor: too sandy.
Dwyer-----	Good-----	Probable-----	Improbable: too sandy.	Poor: too sandy.
117----- Coaliams	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
118*: Cushman-----	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, too clayey, small stones.
Forkwood-----	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
119*: Dailey-----	Good-----	Probable-----	Improbable: too sandy.	Poor: too sandy.
Orpha, moist-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
120----- Draknab	Good-----	Probable-----	Improbable: too sandy.	Poor: too sandy.
121*: Endoquolls-----				
Torrifluvents-----				
122*: Epping-----	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Badland-----				
123*, 124*: Featherlegs-----	Good-----	Probable-----	Probable-----	Poor: area reclaim.
Wolf-----	Good-----	Probable-----	Probable-----	Poor: area reclaim.
125*: Featherlegs-----	Good-----	Probable-----	Probable-----	Poor: area reclaim.
Wolf-----	Good-----	Probable-----	Probable-----	Poor: area reclaim.

Table 9.-Construction Materials--Continued

(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
125: (cont.) Brownrigg-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
126*: Forkwood-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Cambria-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
127*: Forkwood-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
Cambria-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
Cushman-----	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, too clayey, small stones.
128*: Forkwood-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Cushman-----	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, too clayey, small stones.
Terro-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones.
129*: Grummit, cool-----	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, slope.
Rock outcrop-----				
130*: Grummit-----	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, slope.
Rock outcrop-----				

Table 9.-Construction Materials--Continued

(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
131*:				
Grummit-----	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey.
Hilight-----	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey.
132*:				
Grummit-----	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, slope.
Hilight-----	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, slope.
Rock outcrop-----				
133*:				
Hargreave-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, too clayey, small stones.
Cedak-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones, thin layer.
134*:				
Hargreave-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, too clayey, small stones.
Lambman-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
135*:				
Hargreave-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, too clayey, small stones.
Noden-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
136-----				
Haverdad, overflow	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.

Table 9.-Construction Materials--Continued

(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
137*: Haverdad-----	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Clarkelen-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
138*: Haverdad, saline----	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, excess salt.
Clarkelen, saline----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones, excess salt.
139----- Hiland	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
140*: Hiland-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Bowbac-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones, thin layer.
141*: Hiland-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
Bowbac-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones, thin layer.
142*: Hilight-----	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, slope.
Rock outcrop-----				
143*: Hilight-----	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey.
Savageton-----	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.

Table 9.-Construction Materials--Continued

(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
144*: Jayem-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Julesburg-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
145*: Jayem-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
Julesburg-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
146*: Jayem-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Phiferon-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones.
Trelona-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
147----- Keeline	Good-----	Improbable: excess fines.	Improbable: excess fines.	Good.
148----- Keeline	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
149*: Keeline-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Good.
Kishona-----	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
150*: Keeline-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
Kishona-----	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Theedle-----	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
151*: Keyner-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt, excess sodium.
Slickspots-----				

Table 9.-Construction Materials--Continued

(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
152----- Kishona, sodic	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
153*: Kishona-----	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Cambria-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
154*: Kishona-----	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
Cambria-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
Theedle-----	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, too clayey, slope.
155----- Las Animas	Fair: wetness.	Probable-----	Improbable: too sandy.	Fair: too sandy, small stones.
156*, 157*: Lithic haplustolls---				
Rock outcrop-----				
158----- Lohmiller	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
159*: Lohmiller, saline----	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Haverdad, saline----	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, excess salt.
160----- Manzanola	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
161----- Minnequa	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, too clayey.

Table 9.-Construction Materials--Continued

(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
162*: Minnequa-----	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Midway-----	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, slope.
163----- Moskee	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
164*: Moskee-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Manter-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
165*: Moskee, dry-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Manter, dry-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
166----- Noden	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
167*: Orella-----	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey.
Cadoma-----	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Rock outcrop-----				
168*: Orpha, moist-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
Dailey-----	Good-----	Probable-----	Improbable: too sandy.	Poor: too sandy.
169*: Orpha-----	Good-----	Probable-----	Improbable: too sandy.	Poor: too sandy.

Table 9.--Construction Materials--Continued

(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
169: (cont.)				
Dwyer-----	Good-----	Probable-----	Improbable: too sandy.	Poor: too sandy.
170*:				
Orpha-----	Good-----	Probable-----	Improbable: too sandy.	Poor: too sandy.
Dwyer-----	Good-----	Probable-----	Improbable: too sandy.	Poor: too sandy.
Taluce-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
171.-----				
Oxyaquic Torrifluvents				
172-----				
Paiges	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
173*:				
Phiferson-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Tassel-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Rock outcrop-----				
174*:				
Phiferson-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones.
Trelona-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
175-----				
Pierre	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
176*:				
Pierre-----	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Grummit-----	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, slope.
177-----				
Recluse, dry	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.

Table 9.-Construction Materials--Continued

(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
178*: Recluse-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Cedak-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones, thin layer.
179*: Recluse-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
Cedak-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones, thin layer.
180*: Rhoame-----	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Bahl-----	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
181*: Rock outcrop				
182*: Rock outcrop-----				
Tassel-----	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
183----- Samday	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey.
184*: Samday-----	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, slope.
Pierre-----	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
185*: Samday-----	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey.

Table 9.-Construction Materials--Continued

(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
185: (cont.) Savageton-----	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
Bahl-----	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
186*: Savageton-----	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
Bahl-----	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
187*: Schamber-----	Fair: large stones, slope.	Probable-----	Probable-----	Poor: too sandy, small stones, area reclaim.
Tullock-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
188----- Senlar	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
189*: Shingle-----	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Rock outcrop-----				
Samday-----	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, slope.
190----- Silhouette	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
191*: Skilak-----	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, excess salt.
Kishona-----	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.

Table 9.-Construction Materials--Continued

(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
192*: Sunup-----	Poor: depth to rock, large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: depth to rock, large stones, slope.
Rock outcrop-----				
193*: Taluce, cool-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Keeline-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
194*: Taluce-----	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Rock outcrop-----				
Shingle-----	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
195*: Taluce-----	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Rock outcrop-----				
Turnercrest-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
196*: Taluce-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
Shingle-----	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
197*: Taluce-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Tulloch-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Rock outcrop-----				
198*: Taluce-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.

Table 9.-Construction Materials--Continued

(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
198: (cont.)				
Turnercrest-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones, slope.
Keeline-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
199*:				
Tassel-----	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Ponderosa-----	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Rock outcrop-----				
200*:				
Tassel-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
Trelona-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
Phiferon-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones.
201*:				
Terro-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones.
Turnercrest-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones.
202*:				
Terro-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones.
Vonalee-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
203*:				
Terro-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones, slope.
Vonalee-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
Taluce-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.

Table 9.-Construction Materials--Continued

(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
204*: Theedle-----	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, too clayey.
Kishona-----	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
205*: Theedle-----	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, too clayey, slope.
Kishona-----	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
206*: Theedle-----	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, too clayey, slope.
Kishona-----	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
Shingle-----	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
207----- Thirtynine	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
208*: Thirtynine-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Kadoka-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones, thin layer.
209*: Threetop-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones, thin layer.
Sunup-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.

Table 9.-Construction Materials--Continued

(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
210*: Torrington-----	Poor: thin layer, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer, depth to rock.
Julesburg-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
211----- Torriorthents				
212*: Trelona-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Phiferson-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones, slope.
Vetal-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Good.
213----- Ulm	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
214*: Ulm-----	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Bidman-----	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
215*: Ulm-----	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Forkwood-----	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
216----- Ustic Torriorthents				
217*: Ustic Torriorthents, cool-----				
Torriorthentic Haplustolls-----				
Rock outcrop-----				

Table 9.-Construction Materials--Continued

(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
218, 219----- Vetal	Good-----	Improbable: excess fines.	Improbable: excess fines.	Good.
220*: Vetal-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Good.
Phiferson-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones.
221*: Vetal-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Good.
Phiferson-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones, slope.
222----- Vonalee	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
223*: Vonalee-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Keeline-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Good.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 10.-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	Irrigation	Terraces and diversions	Grassed waterways
100*: Absted-----	Slight-----	Severe: excess sodium.	Soil blowing, percs slowly, excess sodium.	Erodes easily, soil blowing, percs slowly.	Too arid, excess sodium, erodes easily.
Arvada-----	Slight-----	Severe: excess sodium.	Droughty, soil blowing, percs slowly.	Erodes easily, soil blowing, percs slowly.	Too arid, excess sodium, erodes easily.
101*: Absted-----	Slight-----	Severe: excess sodium.	Percs slowly, excess sodium.	Erodes easily, percs slowly.	Too arid, excess sodium, erodes easily.
Cambria-----	Moderate: seepage.	Severe: piping.	Favorable-----	Erodes easily----	Too arid, erodes easily.
102*: Albinas-----	Moderate: seepage, slope.	Severe: piping.	Slope-----	Erodes easily----	Erodes easily.
Recluse-----	Severe: seepage.	Severe: piping.	Slope-----	Erodes easily----	Too arid, erodes easily.
103*: Alice-----	Severe: seepage.	Severe: piping.	Slope, soil blowing.	Soil blowing----	Too arid.
Manter-----	Severe: seepage.	Severe: piping.	Slope, soil blowing.	Erodes easily, soil blowing.	Too arid, erodes easily.
104*: Alice-----	Severe: seepage.	Severe: piping.	Slope, soil blowing.	Soil blowing----	Too arid.
Phiferson-----	Severe: seepage.	Severe: piping.	Slope, soil blowing.	Depth to rock, soil blowing.	Too arid, depth to rock.
105*----- Badland					
106----- Bahl	Moderate: slope.	Moderate: hard to pack.	Slope, slow intake, percs slowly.	Erodes easily, percs slowly.	Too arid, erodes easily.
107*: Bahl-----	Slight-----	Moderate: hard to pack.	Slow intake, percs slowly.	Erodes easily, percs slowly.	Too arid, erodes easily.
Petrie-----	Slight-----	Moderate: hard to pack.	Slow intake, percs slowly, erodes easily.	Erodes easily, percs slowly.	Too arid, erodes easily, percs slowly.
108----- Bayard	Severe: seepage.	Severe: piping.	Soil blowing----	Soil blowing----	Too arid.

Table 10.-Water Management--Continued

(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	Irrigation	Terraces and diversions	Grassed waterways
109*: Bidman-----	Slight-----	Slight-----	Percs slowly----	Erodes easily----	Too arid, erodes easily.
Slickspots-----					
110*: Brownrigg-----	Severe: depth to rock, slope.	Severe: large stones.	Slope, droughty, depth to rock.	Slope, large stones, depth to rock.	Too arid, large stones, slope.
Featherlegs-----	Severe: seepage, slope.	Severe: seepage.	Slope, erodes easily.	Slope, erodes easily.	Too arid, slope, erodes easily.
Wolf-----	Severe: seepage, slope.	Moderate: thin layer.	Slope-----	Slope, erodes easily.	Too arid, slope, erodes easily.
111*: Bumbob-----	Moderate: slope.	Severe: hard to pack.	Slope, slow intake, percs slowly.	Erodes easily, percs slowly.	Too arid, erodes easily, percs slowly.
Rhoame-----	Moderate: slope.	Moderate: hard to pack.	Slope, slow intake, percs slowly.	Erodes easily, percs slowly.	Too arid, erodes easily, percs slowly.
112*: Busher-----	Severe: seepage.	Severe: piping.	Slope, droughty, fast intake.	Soil blowing-----	Too arid, droughty.
Phiferson-----	Severe: seepage.	Severe: piping.	Slope, fast intake, soil blowing.	Depth to rock, soil blowing.	Too arid, depth to rock.
113----- Cadoma	Moderate: depth to rock, slope.	Moderate: thin layer, hard to pack.	Slope, percs slowly, depth to rock.	Depth to rock, erodes easily.	Too arid, erodes easily.
114*: Cedak-----	Severe: slope.	Severe: piping.	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
Trelona-----	Severe: depth to rock, slope.	Severe: piping.	Slope, soil blowing, depth to rock.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
115----- Clarkelen, overflow	Severe: seepage.	Severe: seepage, piping.	Droughty, soil blowing.	Too sandy, soil blowing.	Too arid, droughty.
116*: Clarkelen-----	Severe: seepage.	Severe: seepage, piping.	Droughty, soil blowing.	Too sandy, soil blowing.	Too arid, droughty.

Table 10.-Water Management--Continued

(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	Irrigation	Terraces and diversions	Grassed waterways
116: (cont.)					
Draknab-----	Severe: seepage.	Severe: seepage, piping.	Droughty, soil blowing.	Too sandy, soil blowing.	Too arid, droughty.
Dwyer-----	Severe: seepage.	Severe: seepage, piping.	Slope, droughty, fast intake.	Too sandy, soil blowing.	Too arid, droughty.
117-----					
Coaliams	Moderate: seepage, slope.	Moderate: piping.	Slope-----	Erodes easily----	Too arid, erodes easily.
118*:					
Cushman-----	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Slope, depth to rock.	Depth to rock, erodes easily.	Too arid, erodes easily.
Forkwood-----	Moderate: seepage, slope.	Moderate: piping.	Slope-----	Erodes easily----	Too arid, erodes easily.
119*:					
Dailey-----	Severe: seepage.	Severe: seepage, piping.	Slope, droughty, fast intake.	Too sandy, soil blowing.	Too arid, droughty.
Orpha, moist----	Severe: seepage.	Severe: piping.	Slope, droughty, fast intake.	Too sandy, soil blowing.	Too arid, droughty.
120-----					
Draknab	Severe: seepage.	Severe: seepage, piping.	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Too arid, droughty.
121*:					
Endoaquolls-----					
Torrifluvents----					
122*:					
Epping-----	Severe: depth to rock, slope.	Severe: piping.	Slope, depth to rock, erodes easily.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
Badland-----					
123*:					
Featherlegs-----	Severe: seepage.	Severe: seepage.	Erodes easily----	Erodes easily----	Too arid, erodes easily.
Wolf-----	Severe: seepage.	Moderate: thin layer.	Slope-----	Erodes easily----	Too arid, erodes easily.
124*:					
Featherlegs-----	Severe: seepage, slope.	Severe: seepage.	Slope, erodes easily.	Slope, erodes easily.	Too arid, slope, erodes easily.

Table 10.-Water Management--Continued

(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	Irrigation	Terraces and diversions	Grassed waterways
124: (cont.)					
Wolf-----	Severe: seepage, slope.	Moderate: thin layer.	Slope-----	Slope, erodes easily.	Too arid, slope, erodes easily.
125*:					
Featherlegs-----	Severe: seepage.	Severe: seepage.	Slope, erodes easily.	Erodes easily----	Too arid, erodes easily.
Wolf-----	Severe: seepage.	Moderate: thin layer.	Slope-----	Erodes easily----	Too arid, erodes easily.
Brownrigg-----	Severe: depth to rock, slope.	Severe: large stones.	Slope, droughty, depth to rock.	Slope, large stones, depth to rock.	Too arid, large stones, slope.
126*:					
Forkwood-----	Severe: seepage.	Severe: piping.	Slope-----	Erodes easily----	Too arid, erodes easily.
Cambria-----	Severe: seepage.	Severe: piping.	Slope-----	Erodes easily----	Too arid, erodes easily.
127*:					
Forkwood-----	Severe: seepage, slope.	Severe: piping.	Slope-----	Slope, erodes easily.	Too arid, slope, erodes easily.
Cambria-----	Severe: seepage, slope.	Severe: piping.	Slope-----	Slope, erodes easily.	Too arid, slope, erodes easily.
Cushman-----	Severe: slope.	Severe: thin layer.	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
128*:					
Forkwood-----	Severe: seepage.	Severe: piping.	Slope-----	Erodes easily----	Too arid, erodes easily.
Cushman-----	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Slope, depth to rock.	Depth to rock, erodes easily.	Too arid, erodes easily.
Terro-----	Severe: seepage.	Severe: piping.	Slope, soil blowing, depth to rock.	Depth to rock, soil blowing.	Too arid, depth to rock.
129*:					
Grummit, cool----	Severe: depth to rock, slope.	Severe: thin layer.	Slope, percs slowly.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
Rock outcrop-----					

Table 10.-Water Management--Continued

(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	Irrigation	Terraces and diversions	Grassed waterways
130*: Grummit-----	Severe: depth to rock, slope.	Severe: thin layer.	Slope, slow intake, percs slowly.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
Rock outcrop----					
131*: Grummit-----	Severe: depth to rock, slope.	Severe: thin layer.	Slope, slow intake, percs slowly.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
Hilight-----	Severe: depth to rock, slope.	Severe: thin layer.	Slope, slow intake, percs slowly.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
132*: Grummit-----	Severe: depth to rock, slope.	Severe: thin layer.	Slope, slow intake, percs slowly.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
Hilight-----	Severe: depth to rock, slope.	Severe: thin layer.	Slope, percs slowly.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
Rock outcrop----					
133*: Hargreave-----	Severe: seepage.	Severe: piping.	Slope, soil blowing, depth to rock.	Depth to rock, erodes easily.	Too arid, erodes easily.
Cedak-----	Moderate: seepage, depth to rock, slope.	Severe: piping.	Slope, soil blowing, depth to rock.	Depth to rock, erodes easily.	Too arid, erodes easily.
134*: Hargreave-----	Severe: seepage.	Severe: piping.	Slope, soil blowing, depth to rock.	Depth to rock, erodes easily.	Too arid, erodes easily.
Lambman-----	Severe: depth to rock.	Severe: thin layer.	Slope, depth to rock.	Depth to rock, erodes easily.	Too arid, erodes easily.
135*: Hargreave-----	Severe: seepage.	Severe: piping.	Slope, soil blowing, depth to rock.	Depth to rock, erodes easily.	Too arid, erodes easily.
Noden-----	Severe: seepage.	Severe: thin layer.	Slope, soil blowing.	Erodes easily, soil blowing.	Too arid, erodes easily.
136----- Haverdad, overflow	Moderate: seepage.	Moderate: piping.	Erodes easily----	Erodes easily----	Too arid, erodes easily.

Table 10.-Water Management--Continued

(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	Irrigation	Terraces and diversions	Grassed waterways
137*:					
Haverdad-----	Moderate: seepage.	Moderate: piping.	Erodes easily----	Erodes easily----	Too arid, erodes easily.
Clarkelen-----	Severe: seepage.	Severe: seepage, piping.	Droughty, soil blowing.	Too sandy, soil blowing.	Too arid, droughty.
138*:					
Haverdad, saline-	Moderate: seepage.	Moderate: piping.	Excess salt-----	Erodes easily----	Too arid, erodes easily.
Clarkelen, saline	Severe: seepage.	Severe: piping.	Droughty, soil blowing, excess salt.	Soil blowing-----	Too arid, droughty.
139-----	Severe: seepage.	Severe: piping.	Slope, soil blowing.	Soil blowing-----	Too arid.
Hiland					
140*:					
Hiland-----	Severe: seepage.	Severe: piping.	Slope, soil blowing.	Soil blowing-----	Too arid.
Bowbac-----	Severe: seepage.	Severe: piping.	Slope, soil blowing, depth to rock.	Depth to rock, soil blowing.	Too arid, depth to rock.
141*:					
Hiland-----	Severe: seepage, slope.	Severe: piping.	Slope, soil blowing.	Slope, soil blowing.	Too arid, slope.
Bowbac-----	Severe: slope, seepage.	Severe: piping.	Slope, soil blowing, depth to rock.	Slope, depth to rock, soil blowing.	Too arid, slope, depth to rock.
142*:					
Hilight-----	Severe: depth to rock, slope.	Severe: thin layer.	Slope, slow intake, percs slowly.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
Rock outcrop----					
143*:					
Hilight-----	Severe: depth to rock, slope.	Severe: thin layer.	Slope, slow intake, percs slowly.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
Savageton-----	Severe: slope.	Severe: excess sodium.	Slope, slow intake, percs slowly.	Slope, depth to rock, erodes easily.	Too arid, slope, excess sodium.
144*:					
Jayem-----	Severe: seepage.	Severe: piping.	Slope, soil blowing.	Erodes easily, soil blowing.	Too arid, erodes easily.
Julesburg-----	Severe: seepage.	Severe: piping.	Slope, soil blowing.	Too sandy, soil blowing.	Too arid.

Table 10.-Water Management--Continued

(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	Irrigation	Terraces and diversions	Grassed waterways	
145*:						
Jayem-----	Severe: seepage, slope.	Severe: piping.	Slope, soil blowing.	Slope, erodes easily, soil blowing.	Too arid, slope, erodes easily.	
Julesburg-----	Severe: seepage, slope.	Severe: piping.	Slope, soil blowing.	Slope, too sandy, soil blowing.	Too arid, slope.	
146*:						
Jayem-----	Severe: seepage.	Severe: piping.	Slope, soil blowing.	Erodes easily, soil blowing.	Too arid, erodes easily.	
Phiferson-----	Severe: seepage.	Severe: piping.	Slope, soil blowing.	Depth to rock, soil blowing.	Too arid, depth to rock.	
Trelona-----	Severe: depth to rock.	Severe: piping.	Slope, soil blowing, depth to rock.	Depth to rock, erodes easily.	Too arid, erodes easily.	
147-----	Severe: seepage.	Severe: piping.	Slope, soil blowing.	Soil blowing-----	Too arid.	
Keeline						
148-----	Severe: seepage, slope.	Severe: piping.	Slope, soil blowing.	Slope, soil blowing.	Too arid, slope.	
Keeline						
149*:						
Keeline-----	Severe: seepage.	Severe: piping.	Slope, soil blowing.	Soil blowing-----	Too arid.	
Kishona-----	Moderate: seepage, slope.	Moderate: piping.	Slope-----	Erodes easily-----	Too arid, erodes easily.	
150*:						
Keeline-----	Severe: seepage, slope.	Severe: piping.	Slope, soil blowing.	Slope, soil blowing.	Too arid, slope.	
Kishona-----	Severe: slope.	Moderate: piping.	Slope-----	Slope, erodes easily.	Too arid, slope, erodes easily.	
Theedle-----	Severe: slope.	Severe: thin layer.	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.	
151*:						
Keyner-----	Moderate: seepage, slope.	Severe: excess sodium.	Slope, soil blowing, excess sodium.	Soil blowing-----	Too arid, excess sodium.	
Slickspots-----						
152-----	Moderate: slope.	Severe: excess sodium.	Slope, erodes easily, excess sodium.	Erodes easily-----	Too arid, excess sodium, erodes easily.	
Kishona, sodic						

Table 10.-Water Management--Continued

(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	Irrigation	Terraces and diversions	Grassed waterways
153*:					
Kishona-----	Moderate: seepage, slope.	Moderate: piping.	Slope-----	Erodes easily----	Too arid, erodes easily.
Cambria-----	Severe: seepage.	Severe: piping.	Slope-----	Erodes easily----	Too arid, erodes easily.
154*:					
Kishona-----	Severe: slope.	Moderate: piping.	Slope-----	Slope, erodes easily.	Too arid, slope, erodes easily.
Cambria-----	Severe: slope.	Severe: piping.	Slope-----	Slope, erodes easily.	Too arid, slope, erodes easily.
Theedle-----	Severe: slope.	Severe: thin layer.	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
155-----	Severe: seepage.	Severe: piping, wetness.	Wetness, soil blowing.	Wetness-----	Favorable.
Ias Animas					
156*, 157*:					
Lithic					
Haplustolls----					
Rock outcrop----					
158-----	Slight-----	Moderate: hard to pack.	Slow intake, percs slowly.	Erodes easily, percs slowly.	Too arid, erodes easily, percs slowly.
Lohmiller					
159*:					
Lohmiller, saline	Slight-----	Moderate: hard to pack.	Percs slowly, excess salt.	Erodes easily, percs slowly.	Too arid, erodes easily, percs slowly.
Haverdad, saline-	Moderate: seepage.	Moderate: piping.	Excess salt-----	Erodes easily----	Too arid, erodes easily.
160-----	Moderate: slope.	Slight-----	Slope, percs slowly, erodes easily.	Erodes easily, percs slowly.	Too arid, erodes easily, percs slowly.
Manzanola					
161-----	Moderate: depth to rock, slope.	Severe: thin layer.	Slope, percs slowly, depth to rock.	Depth to rock, erodes easily.	Too arid, erodes easily.
Minnequa					
162*:					
Minnequa-----	Severe: slope.	Severe: thin layer.	Slope, percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
Midway-----	Severe: depth to rock, slope.	Severe: thin layer.	Slope, percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.

Table 10.-Water Management--Continued

(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	Irrigation	Terraces and diversions	Grassed waterways
163----- Moskee	Severe: seepage.	Severe: piping.	Soil blowing----	Soil blowing----	Too arid.
164*: Moskee-----	Severe: seepage.	Severe: piping.	Slope, soil blowing.	Soil blowing----	Too arid.
Manter-----	Severe: seepage.	Severe: piping.	Slope, soil blowing.	Erodes easily, soil blowing.	Too arid, erodes easily.
165*: Moskee, dry----	Severe: seepage.	Severe: piping.	Slope, soil blowing.	Soil blowing----	Too arid.
Manter, dry----	Severe: seepage.	Severe: piping.	Slope, soil blowing.	Erodes easily, soil blowing.	Too arid, erodes easily.
166----- Noden	Severe: seepage.	Severe: thin layer.	Soil blowing----	Erodes easily, soil blowing.	Too arid, erodes easily.
167*: Orella-----	Severe: depth to rock, slope.	Severe: thin layer.	Slope, percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
Cadoma-----	Severe: slope.	Moderate: thin layer, hard to pack.	Slope, percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
Rock outcrop----					
168*: Orpha, moist----	Severe: seepage, slope.	Severe: piping.	Slope, droughty, fast intake.	Slope, too sandy, soil blowing.	Too arid, slope, droughty.
Dailey-----	Severe: seepage, slope.	Severe: seepage, piping.	Slope, droughty, fast intake.	Slope, too sandy, soil blowing.	Too arid, slope, droughty.
169*: Orpha-----	Severe: seepage.	Severe: seepage, piping.	Slope, droughty, fast intake.	Too sandy, soil blowing.	Too arid, droughty.
Dwyer-----	Severe: seepage.	Severe: seepage, piping.	Slope, droughty, fast intake.	Too sandy, soil blowing.	Too arid, droughty.
170*: Orpha-----	Severe: seepage, slope.	Severe: seepage, piping.	Slope, droughty, fast intake.	Slope, too sandy, soil blowing.	Too arid, slope, droughty.
Dwyer-----	Severe: seepage, slope.	Severe: seepage, piping.	Slope, droughty, fast intake.	Slope, too sandy, soil blowing.	Too arid, slope, droughty.

Table 10.-Water Management--Continued

(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	Irrigation	Terraces and diversions	Grassed waterways
170: (cont.)					
Taluce-----	Severe: depth to rock, slope.	Severe: piping.	Slope, soil blowing.	Slope, depth to rock, soil blowing.	Too arid, slope, depth to rock.
171-----					
Oxyaquic Torrifluvents					
172-----	Moderate: depth to rock, slope.	Moderate: thin layer, hard to pack.	Slope, slow intake, percs slowly.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
173*:					
Phiferson-----	Severe: seepage, slope.	Severe: piping.	Slope, fast intake, soil blowing.	Slope, depth to rock, soil blowing.	Too arid, slope, depth to rock.
Tassel-----	Severe: depth to rock, slope.	Severe: seepage, piping.	Slope, droughty, fast intake.	Slope, depth to rock, soil blowing.	Too arid, slope, droughty.
Rock outcrop----					
174*:					
Phiferson-----	Severe: seepage.	Severe: piping.	Slope, soil blowing.	Depth to rock, soil blowing.	Too arid, depth to rock.
Trelona-----	Severe: depth to rock.	Severe: piping.	Slope, soil blowing, depth to rock.	Depth to rock, erodes easily.	Too arid, erodes easily.
175-----	Severe: slope.	Severe: hard to pack.	Slope, slow intake, percs slowly.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
176*:					
Pierre-----	Severe: slope.	Severe: hard to pack.	Slope, slow intake, percs slowly.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
Grummit-----	Severe: depth to rock, slope.	Severe: thin layer.	Slope, slow intake, percs slowly.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
177-----	Severe: seepage.	Severe: piping.	Slope-----	Erodes easily----	Too arid, erodes easily.
Recluse, dry					
178*:					
Recluse-----	Severe: seepage.	Severe: piping.	Slope-----	Erodes easily----	Too arid, erodes easily.
Cedak-----	Moderate: seepage, depth to rock, slope.	Severe: piping.	Slope, depth to rock.	Depth to rock, erodes easily.	Too arid, erodes easily.

Table 10.-Water Management--Continued

(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	Irrigation	Terraces and diversions	Grassed waterways
179*:					
Recluse-----	Severe: seepage, slope.	Severe: piping.	Slope-----	Slope, erodes easily.	Too arid, slope, erodes easily.
Cedak-----	Severe: slope.	Severe: piping.	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
180*:					
Rhoame-----	Moderate: slope.	Moderate: hard to pack.	Slope, slow intake, percs slowly.	Erodes easily, percs slowly.	Too arid, erodes easily, percs slowly.
Bahl-----	Moderate: slope.	Moderate: hard to pack.	Slope, slow intake, percs slowly.	Erodes easily, percs slowly.	Too arid, erodes easily.
181*-----					
Rock outcrop					
182*:					
Rock outcrop-----					
Tassel-----	Severe: depth to rock, slope.	Severe: seepage, piping.	Slope, droughty, fast intake.	Slope, depth to rock, soil blowing.	Too arid, slope, droughty.
183-----					
Samday	Severe: depth to rock.	Severe: thin layer.	Slope, slow intake, percs slowly.	Depth to rock, erodes easily.	Too arid, erodes easily.
184*:					
Samday-----	Severe: depth to rock, slope.	Severe: thin layer.	Slope, slow intake, percs slowly.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
Pierre-----	Severe: slope.	Severe: hard to pack.	Slope, slow intake, percs slowly.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
185*:					
Samday-----	Severe: depth to rock.	Severe: thin layer.	Slope, slow intake, percs slowly.	Depth to rock, erodes easily.	Too arid, erodes easily.
Savageton-----	Moderate: depth to rock, slope.	Severe: excess sodium.	Slope, percs slowly.	Depth to rock, erodes easily.	Too arid, excess sodium.
Bahl-----	Moderate: slope.	Moderate: hard to pack.	Slope, percs slowly.	Erodes easily, percs slowly.	Too arid, erodes easily.
186*:					
Savageton-----	Moderate: depth to rock, slope.	Severe: excess sodium.	Slope, percs slowly.	Depth to rock, erodes easily.	Too arid, excess sodium.

Table 10.-Water Management--Continued

(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	Irrigation	Terraces and diversions	Grassed waterways
186: (cont.)					
Bahl-----	Moderate: slope.	Moderate: hard to pack.	Slope, percs slowly.	Erodes easily, percs slowly.	Too arid, erodes easily.
187*:					
Schamber-----	Severe: seepage, slope.	Severe: seepage.	Slope, large stones, droughty.	Slope, large stones, too sandy.	Too arid, large stones, slope.
Tulloch-----	Severe: seepage, slope.	Severe: seepage, piping.	Slope, droughty, fast intake.	Slope, depth to rock, too sandy.	Too arid, slope, droughty.
188-----	Moderate: seepage.	Severe: piping.	Erodes easily----	Erodes easily----	Too arid, erodes easily.
Senlar					
189*:					
Shingle-----	Severe: depth to rock, slope.	Severe: thin layer.	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
Rock outcrop----					
Samday-----	Severe: depth to rock, slope.	Severe: thin layer.	Slope, slow intake, percs slowly.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
190-----	Moderate: slope.	Moderate: hard to pack.	Slope, percs slowly, erodes easily.	Erodes easily, percs slowly.	Too arid, erodes easily, percs slowly.
Silhouette					
191*:					
Skilak-----	Moderate: seepage, slope.	Moderate: piping.	Slope, slow intake, erodes easily.	Erodes easily----	Too arid, erodes easily.
Kishona-----	Moderate: seepage, slope.	Moderate: piping.	Slope, erodes easily.	Erodes easily----	Too arid, erodes easily.
192*:					
Sunup-----	Severe: depth to rock, slope.	Severe: large stones.	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Too arid, large stones, slope.
Rock outcrop----					
193*:					
Taluce, cool----	Severe: depth to rock, slope.	Severe: piping.	Slope, soil blowing, depth to rock.	Slope, depth to rock, soil blowing.	Too arid, slope, depth to rock.
Keeline-----	Severe: seepage, slope.	Severe: piping.	Slope, soil blowing.	Slope, soil blowing.	Too arid, slope.

Table 10.-Water Management--Continued

(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 waterways	Limitations for--			Features affecting--	
	Pond reservoir areas	Embankments, dikes and levees	Irrigation	Terraces and diversions	Grassed
194*:					
Taluca-----	Severe: depth to rock, slope.	Severe: piping.	Slope, soil blowing.	Slope, depth to rock, soil blowing.	Too arid, slope, depth to rock.
Rock outcrop----					
Shingle-----	Severe: depth to rock, slope.	Severe: thin layer.	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
195*:					
Taluca-----	Severe: depth to rock, slope.	Severe: piping.	Slope, soil blowing.	Slope, depth to rock, soil blowing.	Too arid, slope, depth to rock.
Rock outcrop----					
Turnercrest----	Severe: seepage, slope.	Severe: piping.	Slope, soil blowing, depth to rock.	Slope, depth to rock, soil blowing.	Too arid, slope, depth to rock.
196*:					
Taluca-----	Severe: depth to rock, slope.	Severe: piping.	Slope, soil blowing.	Slope, depth to rock, soil blowing.	Too arid, slope, depth to rock.
Shingle-----	Severe: depth to rock, slope.	Severe: thin layer.	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
197*:					
Taluca-----	Severe: depth to rock, slope.	Severe: piping.	Slope, soil blowing.	Slope, depth to rock, soil blowing.	Too arid, slope, depth to rock.
Tulloch-----	Severe: seepage, slope.	Severe: seepage, piping.	Slope, droughty, fast intake.	Slope, depth to rock, too sandy.	Too arid, slope, droughty.
Rock outcrop----					
198*:					
Taluca-----	Severe: depth to rock, slope.	Severe: piping.	Slope, soil blowing.	Slope, depth to rock, soil blowing.	Too arid, slope, depth to rock.
Turnercrest----	Severe: seepage, slope.	Severe: piping.	Slope, soil blowing, depth to rock.	Slope, depth to rock, soil blowing.	Too arid, slope, depth to rock.
Keeline-----	Severe: seepage, slope.	Severe: piping.	Slope, soil blowing.	Slope, soil blowing.	Too arid, slope.

Table 10.-Water Management--Continued

(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	Irrigation	Terraces and diversions	Grassed waterways
199*:					
Tassel-----	Severe: depth to rock, slope.	Severe: seepage, piping.	Slope, droughty, fast intake.	Slope, depth to rock, soil blowing.	Too arid, slope, droughty.
Ponderosa-----	Severe: seepage, slope.	Severe: piping.	Slope, fast intake, soil blowing.	Slope, erodes easily, soil blowing.	Too arid, slope, erodes easily.
Rock outcrop-----					
200*:					
Tassel-----	Severe: depth to rock.	Severe: seepage, piping.	Slope, droughty.	Depth to rock, soil blowing.	Too arid, droughty.
Trelona-----	Severe: depth to rock.	Severe: piping.	Slope, soil blowing, depth to rock.	Depth to rock, erodes easily.	Too arid, erodes easily.
Phiferson-----	Severe: seepage.	Severe: piping.	Slope, soil blowing.	Depth to rock, soil blowing.	Too arid, depth to rock.
201*:					
Terro-----	Severe: seepage.	Severe: piping.	Slope, soil blowing, depth to rock.	Depth to rock, soil blowing.	Too arid, depth to rock.
Turnercrest-----	Severe: seepage.	Severe: piping.	Slope, soil blowing, depth to rock.	Depth to rock, soil blowing.	Too arid, depth to rock.
202*:					
Terro-----	Severe: seepage.	Severe: piping.	Slope, soil blowing, depth to rock.	Depth to rock, soil blowing.	Too arid, depth to rock.
Vonalee-----	Severe: seepage.	Severe: piping.	Slope, droughty.	Too sandy, soil blowing.	Too arid, droughty.
203*:					
Terro-----	Severe: seepage, slope.	Severe: piping.	Slope, soil blowing, depth to rock.	Slope, depth to rock, soil blowing.	Too arid, slope, depth to rock.
Vonalee-----	Severe: seepage, slope.	Severe: piping.	Slope, droughty.	Slope, too sandy, soil blowing.	Too arid, slope, droughty.
Taluce-----	Severe: depth to rock, slope.	Severe: piping.	Slope, soil blowing.	Slope, depth to rock, soil blowing.	Too arid, slope, depth to rock.
204*:					
Theedle-----	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Slope, depth to rock.	Depth to rock, erodes easily.	Too arid, erodes easily.

Table 10.-Water Management--Continued

(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	Irrigation	Terraces and diversions	Grassed waterways
204: (cont.)					
Kishona-----	Moderate: seepage, slope.	Moderate: piping.	Slope-----	Erodes easily----	Too arid, erodes easily.
205*:					
Theedle-----	Severe: slope.	Severe: thin layer.	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
Kishona-----	Severe: slope.	Moderate: piping.	Slope-----	Slope, erodes easily.	Too arid, slope, erodes easily.
206*:					
Theedle-----	Severe: slope.	Severe: thin layer.	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
Kishona-----	Severe: slope.	Moderate: piping.	Slope-----	Slope, erodes easily.	Too arid, slope, erodes easily.
Shingle-----	Severe: depth to rock, slope.	Severe: thin layer.	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
207-----					
Thirtynine	Moderate: seepage, slope.	Severe: piping.	Slope, erodes easily.	Erodes easily----	Too arid, erodes easily.
208*:					
Thirtynine-----	Moderate: seepage, slope.	Severe: piping.	Slope, erodes easily.	Erodes easily----	Too arid, erodes easily.
Kadoka-----	Moderate: seepage, depth to rock, slope.	Severe: piping.	Slope, depth to rock.	Depth to rock, erodes easily.	Too arid, erodes easily.
209*:					
Threetop-----	Severe: seepage.	Severe: piping.	Slope, depth to rock.	Depth to rock, erodes easily.	Too arid, erodes easily.
Sunup-----	Severe: depth to rock, slope.	Severe: thin layer.	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Too arid, large stones, slope.
210*:					
Torrington-----	Severe: seepage.	Severe: piping.	Slope, soil blowing, depth to rock.	Soil blowing, depth to rock.	Too arid, depth to rock.
Julesburg-----	Severe: seepage.	Severe: piping.	Slope, soil blowing.	Too sandy, soil blowing.	Too arid.

Table 10.-Water Management--Continued

(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	Irrigation	Terraces and diversions	Grassed waterways
211----- Torriorthents					
212*:					
Trelona-----	Severe: depth to rock, slope.	Severe: piping.	Slope, soil blowing, depth to rock.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
Phiferson-----	Severe: seepage, slope.	Severe: piping.	Slope, soil blowing.	Slope, depth to rock, soil blowing.	Too arid, slope, depth to rock.
Vetal-----	Severe: seepage.	Severe: piping.	Slope, soil blowing.	Soil blowing-----	Favorable.
213----- Ulm	Moderate: slope.	Moderate: hard to pack.	Slope-----	Erodes easily----	Too arid, erodes easily.
214*:					
Ulm-----	Moderate: slope.	Moderate: hard to pack.	Slope-----	Erodes easily----	Too arid, erodes easily.
Bidman-----	Moderate: slope.	Slight-----	Slope, percs slowly.	Erodes easily----	Too arid, erodes easily.
215*:					
Ulm-----	Moderate: slope.	Moderate: hard to pack.	Slope-----	Erodes easily----	Too arid, erodes easily.
Forkwood-----	Moderate: seepage, slope.	Moderate: piping.	Slope-----	Erodes easily----	Too arid, erodes easily.
216----- Ustic Torriorthents					
217*:					
Ustic Torriorthents, cool-----					
Torriorthentic Haplustolls----					
Rock outcrop----					
218----- Vetal	Severe: seepage.	Severe: piping.	Soil blowing-----	Soil blowing-----	Favorable.
219----- Vetal	Severe: seepage.	Severe: piping.	Slope, soil blowing.	Soil blowing-----	Favorable.
220*:					
Vetal-----	Severe: seepage.	Severe: piping.	Slope, soil blowing.	Soil blowing-----	Favorable.

Table 10.-Water Management--Continued

(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	Irrigation	Terraces and diversions	Grassed waterways	
220*: (cont.) Phiferson-----	Severe: seepage.	Severe: piping.	Slope, soil blowing.	Depth to rock, soil blowing.	Too arid, depth to rock.	
221*: Vetal-----	Severe: seepage.	Severe: piping.	Slope, soil blowing.	Soil blowing----	Favorable.	
Phiferson-----	Severe: seepage, slope.	Severe: piping.	Slope, soil blowing.	Slope, depth to rock, soil blowing.	Too arid, slope, depth to rock.	
222----- Vonalee	Severe: seepage.	Severe: piping.	Slope, droughty.	Too sandy, soil blowing.	Too arid, droughty.	
223*: Vonalee-----	Severe: seepage.	Severe: piping.	Slope, droughty.	Too sandy, soil blowing.	Too arid, droughty.	
Keeline-----	Severe: seepage.	Severe: piping.	Slope, soil blowing.	Soil blowing----	Too arid.	

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 11.—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 3-10 inches	Percentage passing sieve number—				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
100*:											
Absted-----	0-2	Fine sandy loam	SM	A-4	0	85-100	85-100	60-80	35-50	15-25	NP-5
	2-11	Silty clay loam, silty clay.	CL, CH	A-7	0	85-100	85-100	80-90	65-80	40-55	20-30
	11-21	Silty clay loam, silty clay, clay.	CL, CH	A-7	0	85-100	85-100	80-95	70-85	40-55	20-30
	21-60	Silty clay, silty clay loam, clay loam.	CL	A-6, A-7	0	85-100	85-100	80-95	70-90	35-50	15-25
Arvada-----	0-2	Very fine sandy loam.	SM	A-4	0	100	90-100	75-90	35-50	20-30	NP-5
	2-16	Silty clay loam, silty clay, clay.	CL, CH	A-7	0	95-100	90-100	80-95	55-85	40-55	20-35
	16-60	Silty clay loam, silty clay, clay loam.	CL, CH	A-6, A-7	0	95-100	90-100	70-90	50-75	35-55	15-30
101*:											
Absted-----	0-5	Loam	SC-SM, CL-ML, SC, CL	A-4, A-6	0	85-100	85-100	60-80	45-60	25-35	5-15
	5-10	Silty clay loam, silty clay.	CL, CH	A-7	0	85-100	85-100	80-90	65-80	40-55	20-30
	10-19	Silty clay loam, silty clay, clay.	CL, CH	A-7	0	85-100	85-100	80-95	70-85	40-55	20-30
	19-60	Silty clay, silty clay loam, clay loam.	CL	A-6, A-7	0	85-100	85-100	80-95	70-90	35-50	15-25
Cambria-----	0-3	Loam	CL-ML, CL	A-4, A-6	0	90-100	85-100	70-90	55-75	25-35	5-15
	3-13	Clay loam, loam	CL	A-6	0	100	85-100	75-95	60-80	30-40	10-20
	13-60	Clay loam, loam	CL-ML, CL	A-4, A-6	0	100	85-100	75-95	60-80	25-35	5-15
102*:											
Albinas-----	0-10	Loam	CL-ML,	A-4	0	100	95-100	70-90	50-75	20-30	5-10
	10-34	Loam, clay loam, sandy clay loam.	SC, CL	A-6	0	100	95-100	70-85	45-65	30-40	10-20
	34-60	Loam, fine sandy loam.	SM, ML	A-4	0	100	90-100	65-80	35-55	15-30	NP-5
Recluse-----	0-7	Loam	CL-ML, CL	A-4, A-6	0	100	90-100	70-90	50-70	25-35	5-15
	7-24	Loam, clay loam	CL	A-6	0	100	85-100	70-90	60-80	30-40	10-20
	24-60	Loam, very fine sandy loam.	SC-SM, CL-ML, SC, CL	A-4	0	95-100	85-100	70-90	45-60	25-30	5-10
103*:											
Alice-----	0-9	Fine sandy loam	SM	A-4	0	100	95-100	80-100	35-50	15-25	NP-5
	9-19	Fine sandy loam, very fine sandy loam.	SM, ML	A-4	0	100	95-100	80-100	35-55	15-25	NP-5
	19-60	Fine sandy loam, very fine sandy loam, loamy very fine sand.	SM, ML	A-4	0	100	90-100	80-95	35-55	15-25	NP-5

Table 11.--Engineering Index Properties--Continued

(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 3-10 inches Pct	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index	
			Unified	AASHTO		4	10	40	200			
												In
103: (cont.)												
Manter-----	0-9	Fine sandy loam	SM	A-2, A-4	0	95-100	90-100	70-90	30-45	15-25	NP-5	
	9-18	Sandy loam, fine sandy loam.	SM, SC-SM	A-4	0	95-100	90-100	70-90	35-50	20-25	NP-5	
	18-60	Fine sandy loam, sandy loam.	SM	A-4	0	95-100	90-100	65-85	35-50	15-25	NP-5	
104*:												
Alice-----	0-13	Fine sandy loam	SM	A-4	0	100	95-100	80-100	35-50	15-25	NP-5	
	13-28	Fine sandy loam, very fine sandy loam.	SM, ML	A-4	0	100	95-100	80-100	35-55	15-25	NP-5	
	28-60	Fine sandy loam, very fine sandy loam, loamy very fine sand.	SM, ML	A-4	0	100	90-100	80-95	35-55	15-25	NP-5	
Phifer-----	0-8	Fine sandy loam	SM	A-4	0	100	90-100	75-95	35-50	15-25	NP-5	
	8-23	Fine sandy loam, very fine sandy loam.	SM	A-4	0	100	90-100	70-90	35-50	15-25	NP-5	
	23-30	Fine sandy loam, very fine sandy loam.	SM	A-4	0	95-100	80-100	70-90	35-50	15-25	NP-5	
	30	Unweathered bedrock.	-	-	-	-	-	-	-	-	-	
105*:												
Badland												
106-----	0-5	Clay	CL, CH	A-7	0	100	95-100	85-100	70-90	45-55	20-30	
Bahl	5-60	Clay, silty clay	CL, CH	A-7	0	100	95-100	85-100	70-90	45-65	20-35	
107*:												
Bahl-----	0-5	Clay	CL, CH	A-7	0	100	95-100	85-100	70-90	45-55	20-30	
	5-60	Clay, silty clay	CL, CH	A-7	0	100	95-100	85-100	70-90	45-65	20-35	
Petrie-----	0-3	Silty clay	CL, CH	A-7	0	100	95-100	85-95	75-90	45-55	20-30	
	3-60	Clay loam, clay, silty clay.	CL, CH	A-7	0	100	90-100	75-95	70-90	40-60	20-35	
108-----	0-8	Fine sandy loam	SM, SC-SM	A-4	0	100	85-100	65-85	35-50	15-25	NP-5	
Bayard	8-60	Fine sandy loam, very fine sandy loam.	SM	A-4	0	90-100	85-100	65-85	35-50	15-25	NP-5	
109*:												
Bidman-----	0-4	Loam	CL	A-6	0	80-100	80-100	70-85	60-70	30-40	10-15	
	4-12	Clay, clay loam	CH	A-7	0	80-100	80-100	80-100	70-90	50-60	30-40	
	12-60	Clay loam, loam	CL	A-6, A-7	0	80-100	80-100	75-100	65-80	35-45	20-30	
Slickspots-----												
110*:												
Brownrigg-----	0-3	Very cobbly loam	GM-GC, GC	A-2, A-4	30-40	45-70	40-65	35-60	25-45	20-30	5-10	
	3-8	Very gravelly clay loam, very cobbly sandy clay loam.	GC	A-2	15-35	35-50	30-45	30-40	24-35	35-40	15-20	

Table 11.—Engineering Index Properties--Continued

(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 3-10 inches	Percentage passing sieve number—				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
114*: Cedak-----	0-8	Loam	CL-ML, SC-SM, SC, CL	A-4	0	100	90-100	70-85	45-60	25-30	5-10
	8-19	Clay loam, loam	CL	A-6	0	100	90-100	75-95	60-80	30-40	10-20
	19-32	Loam, very fine sandy loam.	CL-ML, SC-SM	A-4	0	100	90-100	70-85	45-65	20-30	5-10
	32	Unweathered bedrock.	-	-	-	-	-	-	-	-	-
Trelona-----	0-10	Fine sandy loam	SM	A-4	0	95-100	80-100	65-80	35-50	15-25	NP-5
	10-19	Fine sandy loam, loamy very fine sand.	SM	A-4, A-2	0	95-100	80-100	60-80	30-50	15-25	NP-5
	19	Unweathered bedrock.	-	-	-	-	-	-	-	-	-
115----- Clarkelen, overflow	0-6	Fine sandy loam	SM	A-2, A-4	0	100	95-100	60-75	30-45	15-25	NP-5
	6-20	Stratified loamy fine sand to fine sandy loam.	SM	A-2, A-4	0	100	95-100	55-70	30-45	15-25	NP-5
	20-60	Stratified fine sand to silt loam.	SM	A-2	0	95-100	85-100	55-70	15-35	15-25	NP-5
116*: Clarkelen-----	0-3	Fine sandy loam	SM	A-2, A-4	0	100	95-100	60-75	30-45	15-25	NP-5
	3-60	Stratified fine sand to silt loam.	SM	A-2	0	95-100	85-100	55-70	15-35	15-25	NP-5
Draknab-----	0-5	Fine sandy loam	SM, SC-SM	A-2, A-4	0	100	90-100	60-75	25-40	0-25	NP-5
	5-60	Stratified fine sandy loam to coarse sand.	SM, SP-SM	A-1, A-2, A-3	0-5	90-100	85-100	35-55	5-25	0-20	NP
Dwyer-----	0-5	Fine sand	SP-SM, SM	A-3, A-2	0	100	100	60-80	5-20	0-20	NP
	5-60	Fine sand, loamy fine sand, loamy sand.	SP-SM, SM	A-3, A-2	0	100	95-100	60-80	5-30	0-20	NP
117----- Coaliams	0-7	Loam	CL-ML, CL	A-4, A-6	0	100	100	75-90	50-70	25-35	5-15
	7-60	Stratified very fine sandy loam to clay loam.	SC, CL	A-6	0	100	95-100	70-85	40-65	30-40	10-20
118*: Cushman-----	0-4	Loam	CL-ML	A-4	0	95-100	90-100	75-90	50-70	20-30	5-10
	4-24	Loam, clay loam	CL	A-6	0	95-100	90-100	75-90	60-80	30-40	10-20
	24-37	Loam, clay loam	CL-ML, CL	A-4, A-6	0	90-100	90-100	70-85	50-70	25-35	5-15
	37	Unweathered bedrock.	-	-	-	-	-	-	-	-	-
Forkwood-----	0-4	Loam	ML, CL-ML	A-4	0	85-100	85-100	70-90	50-70	20-30	5-10
	4-15	Loam, clay loam	CL	A-6	0	85-100	85-100	70-90	55-75	30-40	10-20
	15-60	Loam, clay loam	CL	A-6	0	75-100	75-100	70-90	50-70	30-40	10-20

Table 11.—Engineering Index Properties--Continued

(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 3-10 inches	Percentage passing sieve number—				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
119*: Dailey-----	0-14	Loamy sand	SM	A-2	0	100	100	50-65	15-25	-	NP
	14-60	Loamy sand, loamy fine sand, fine sand.	SW-SM, SM	A-2	0	100	100	55-70	10-25	-	NP
Orpha, moist----	0-4	Loamy sand	SM	A-2	0	100	95-100	80-90	25-35	0-20	NP
	4-19	Loamy fine sand, fine sand.	SM	A-2	0	100	95-100	80-90	25-35	0-20	NP
	19-60	Fine sand	SM	A-2	0	100	95-100	75-85	20-30	0-20	NP
120----- Draknab	0-5	Loamy fine sand	SM	A-2	0	100	90-100	70-85	25-35	0-20	NP
	5-60	Stratified fine sandy loam to coarse sand.	SM, SP-SM	A-1, A-2, A-3	0-5	90-100	85-100	35-55	5-25	0-20	NP
121*: Endoaquolls----											
Torrifluvents---											
122*: Epping-----	0-4	Silt loam-----	ML, CL-ML	A-4	0	100	95-100	95-100	75-90	25-35	5-10
	4-13	Silt loam, loam	ML, CL-ML	A-4	0	100	95-100	85-100	70-90	25-35	5-10
	13	Unweathered bedrock.			-	-	-	-	-	-	-
Badland-----											
123*, 124*: Featherlegs----	0-5	Loam	ML	A-4	0	100	100	85-95	60-75	15-20	NP-5
	5-23	Clay loam, sandy clay loam.	CL	A-6	0	100	100	80-100	60-80	25-35	10-20
	23-38	Loam	ML	A-4	0	100	100	85-95	60-75	15-20	NP-5
	38-60	Very gravelly sandy loam.	GW, GP	A-1	5-25	30-45	25-40	15-25	0-5	15-20	NP-5
Wolf-----	0-4	Loam	CL-ML, CL	A-4, A-6	0	95-100	95-100	80-90	60-70	25-35	5-15
	4-18	Clay loam, loam, sandy clay loam.	CL	A-6	0	95-100	95-100	85-95	55-75	35-40	15-20
	18-32	Loam, clay loam.	CL-ML, CL	A-4, A-6	0-10	95-100	95-100	85-95	55-75	25-35	5-15
	32-60	Extremely gravelly sandy loam.	GW	A-1	15-30	30-45	25-40	15-30	0-5	<20	NP-5
125*: Featherlegs----	0-5	Loam	ML	A-4	0	100	100	85-95	60-75	15-20	NP-5
	5-23	Clay loam, sandy clay loam.	CL	A-6	0	100	100	80-100	60-80	25-35	10-20
	23-38	Loam	ML	A-4	0	100	100	85-95	60-75	15-20	NP-5
	38-60	Very gravelly sandy loam.	GW, GP	A-1	5-25	30-45	25-40	15-25	0-5	15-20	NP-5
Wolf-----	0-4	Loam	CL-ML, CL	A-4, A-6	0	95-100	95-100	80-90	60-70	25-35	5-15
	4-18	Clay loam, loam, sandy clay loam.	CL	A-6	0	95-100	95-100	85-95	55-75	35-40	15-20
	18-32	Loam, clay loam.	CL-ML, CL	A-4, A-6	0-10	95-100	95-100	85-95	55-75	25-35	5-15
	32-60	Extremely gravelly sandy loam.	GW	A-1	15-30	30-45	25-40	15-30	0-5	<20	NP-5

Table 11.—Engineering Index Properties--Continued

(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 3-10 inches Pct	Percentage passing sieve number—				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
134*:											
Hargreave-----	0-5	Fine sandy loam	SM, SC-SM	A-4	0	95-100	90-100	70-85	35-50	15-25	NP-5
	5-19	Sandy clay loam, loam.	SC, CL	A-6	0	100	90-100	80-90	45-65	30-40	10-20
	19-26	Fine sandy loam, very fine sandy loam.	SM, SC-SM	A-4	0	95-100	85-100	65-85	35-50	15-25	NP-5
	26	Unweathered bedrock.	-	-	-	-	-	-	-	-	-
Lambman-----	0-4	Loam	SC-SM, CL-ML	A-4	0	90-100	85-100	60-80	40-60	20-30	10-20
	4-17	Loam, clay loam	SC, CL	A-6	0	85-100	80-100	55-75	40-60	30-40	10-20
	17	Unweathered bedrock.	-	-	-	-	-	-	-	-	-
135*:											
Hargreave-----	0-5	Fine sandy loam	SM, SC-SM	A-4	0	95-100	90-100	70-85	35-50	15-25	NP-5
	5-25	Sandy clay loam, loam.	SC, CL	A-6	0	100	90-100	80-90	45-65	30-40	10-20
	25-38	Fine sandy loam, very fine sandy loam.	SM, SC-SM	A-4	0	95-100	85-100	65-85	35-50	15-25	NP-5
	38	Unweathered bedrock.	-	-	-	-	-	-	-	-	-
Noden-----	0-15	Fine sandy loam	SM	A-4	0	100	95-100	75-90	35-50	15-25	NP-5
	15-36	Sandy clay loam, clay loam, loam.	CL	A-6	0	100	95-100	60-80	50-70	30-40	10-20
	36-60	Fine sandy loam, sandy loam.	SM	A-4	0	100	90-100	70-85	35-50	15-25	NP-5
136-----											
Haverdad, overflow	0-9	Loam	CL-ML, CL	A-4, A-6	0	95-100	90-100	70-90	50-70	25-35	5-15
	9-60	Stratified sandy loam to silty clay loam.	CL	A-6	0	95-100	85-100	70-90	50-70	30-40	10-20
137*:											
Haverdad-----	0-4	Loam	CL-ML, CL	A-4, A-6	0	95-100	90-100	70-90	50-70	25-35	5-15
	4-60	Stratified sandy loam to silty clay loam.	CL	A-6	0	95-100	85-100	70-90	50-70	30-40	10-20
Clarkelen-----											
	0-3	Fine sandy loam	SM	A-2, A-4	0	100	95-100	60-75	30-45	15-25	NP-5
	3-60	Stratified fine sand to silt loam.	SM	A-2	0	95-100	85-100	55-70	15-35	15-25	NP-5
138*:											
Haverdad, saline	0-5	Loam	CL-ML, CL	A-4, A-6	0	95-100	95-100	70-90	50-70	25-35	5-15
	5-28	Stratified loam to silty clay loam.	CL	A-6	0	95-100	90-100	70-90	55-75	30-40	10-20
	28-60	Stratified fine sandy loam to silty clay loam.	CL	A-6	0	90-100	85-100	65-90	60-80	30-40	10-20

Table 11.--Engineering Index Properties--Continued

(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 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
147----- Keeline	0-4	Fine sandy loam	SM	A-2, A-4	0	100	95-100	60-75	30-45	15-25	NP-5
	4-60	Sandy loam, fine sandy loam.	SM	A-2, A-4	0	100	95-100	55-75	20-40	15-25	NP-5
148----- Keeline	0-2	Fine sandy loam	SM	A-2, A-4	0	100	95-100	60-75	30-45	15-25	NP-5
	2-60	Sandy loam, fine sandy loam.	SM	A-2, A-4	0	100	95-100	55-75	20-40	15-25	NP-5
149*: Keeline-----	0-3	Sandy loam	SM	A-2, A-4	0	100	95-100	55-70	20-40	15-25	NP-5
	3-60	Sandy loam, fine sandy loam.	SM	A-2, A-4	0	100	95-100	55-75	20-40	15-25	NP-5
Kishona-----	0-5	Loam	CL, CL-ML	A-4, A-6	0	95-100	85-100	70-90	60-80	25-35	5-15
	5-60	Loam, clay loam, silty clay loam.	CL	A-6	0	95-100	85-100	70-90	65-85	30-40	10-20
150*: Keeline-----	0-6	Fine sandy loam	SM	A-2, A-4	0	100	95-100	60-75	30-45	15-25	NP-5
	6-60	Sandy loam, fine sandy loam.	SM	A-2, A-4	0	100	95-100	55-75	20-40	15-25	NP-5
Kishona-----	0-3	Loam	CL, CL-ML	A-4, A-6	0	95-100	85-100	70-90	60-80	25-35	5-15
	3-60	Loam, clay loam, silty clay loam.	CL	A-6	0	95-100	85-100	70-90	65-85	30-40	10-20
Theedle-----	0-4	Loam	CL-ML, CL	A-4, A-6	0	95-100	95-100	70-90	55-75	25-35	5-15
	4-30	Loam, clay loam	CL	A-6	0	90-100	85-100	75-90	60-80	30-40	10-20
	30	Unweathered bedrock.	-	-	-	-	-	-	-	-	-
151*: Keyner-----	0-5	Fine sandy loam	SC-SM, SM	A-2, A-4	0	85-100	75-100	60-85	30-50	15-25	NP-5
	5-15	Loam, clay loam	CL	A-6	0	95-100	85-100	55-75	50-70	30-40	10-15
	15-42	Silty clay loam, clay loam.	CL	A-7	0	95-100	85-100	55-80	50-75	40-45	15-20
	42-60	Silt loam, very fine sandy loam.	SM, ML	A-4	0	90-100	75-100	60-80	35-55	15-30	NP-5
Slickspots-----											
152----- Kishona, sodic	0-2	Silty clay loam	CL	A-6	0	100	85-100	70-90	60-80	30-40	10-20
	2-14	Silty clay loam	CL	A-6, A-7-6	0	90-100	85-100	70-90	60-80	30-45	10-20
	14-60	Silty clay loam	CL	A-6, A-7-6	0	90-100	85-100	65-90	55-75	30-45	10-20
153*: Kishona-----	0-4	Loam	CL, CL-ML	A-4, A-6	0	95-100	85-100	70-90	60-80	25-35	5-15
	4-60	Loam, clay loam, silty clay loam.	CL	A-6	0	95-100	85-100	70-90	65-85	30-40	10-20
Cambria-----	0-4	Loam	CL-ML, CL	A-4, A-6	0	90-100	85-100	70-90	55-75	25-35	5-15
	4-10	Clay loam, loam	CL	A-6	0	100	85-100	75-95	60-80	30-40	10-20
	10-31	Clay loam, loam	CL-ML, CL	A-4, A-6	0	100	85-100	75-95	60-80	25-35	5-15
	31-60	Fine sandy loam, loam.	SM, ML	A-4	0	100	85-100	70-85	45-65	20-30	NP-5

Table 11.--Engineering Index Properties--Continued

(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 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
163----- Moskee	0-8	Fine sandy loam	SC-SM, SC	A-2, A-4	0	100	90-100	70-90	30-45	25-30	5-10
	8-24	Loam, sandy clay loam.	SC, CL	A-6	0	100	90-100	70-90	45-65	30-40	10-20
	24-60	Sandy loam, fine sandy loam.	SM, SC-SM	A-2, A-4	0	95-100	85-100	65-85	25-40	15-25	NP-5
164*:											
Moskee-----	0-10	Fine sandy loam	SC-SM, SC	A-2, A-4	0	100	90-100	70-90	30-45	25-30	5-10
	10-31	Loam, sandy clay loam.	SC, CL	A-6	0	100	90-100	70-90	45-65	30-40	10-20
	31-60	Sandy loam, fine sandy loam.	SM, SC-SM	A-2, A-4	0	95-100	85-100	65-85	25-40	15-25	NP-5
Manter-----	0-8	Fine sandy loam	SM	A-2, A-4	0	95-100	90-100	70-90	30-45	15-25	NP-5
	8-29	Sandy loam, fine sandy loam.	SM, SC-SM	A-4	0	95-100	90-100	70-90	35-50	20-25	NP-5
	29-60	Fine sandy loam, sandy loam.	SM	A-4	0	95-100	90-100	65-85	35-50	15-25	NP-5
165*:											
Moskee, dry----	0-10	Fine sandy loam	SC-SM, SC	A-2, A-4	0	100	90-100	70-90	30-45	25-30	5-10
	10-27	Loam, sandy clay loam.	SC, CL	A-6	0	100	90-100	70-90	45-65	30-40	10-20
	27-60	Sandy loam, fine sandy loam.	SM, SC-SM	A-2, A-4	0	95-100	85-100	65-85	25-40	15-25	NP-5
Manter, dry----	0-11	Sandy loam	SM	A-2, A-4	0	95-100	90-100	70-90	30-45	15-25	NP-5
	11-34	Sandy loam, fine sandy loam.	SM, SC-SM	A-4	0	95-100	90-100	70-90	35-50	20-25	NP-5
	34-60	Fine sandy loam, sandy loam.	SM	A-4	0	95-100	90-100	65-85	35-50	15-25	NP-5
166-----											
166----- Noden	0-7	Fine sandy loam	SM	A-4	0	100	95-100	75-90	35-50	15-25	NP-5
	7-32	Sandy clay loam, clay loam, loam.	CL	A-6	0	100	95-100	60-80	50-70	30-40	10-20
	32-60	Fine sandy loam, sandy loam.	SM	A-4	0	100	90-100	70-85	35-50	15-25	NP-5
167*:											
Orella-----	0-3	Silty clay loam	CL	A-6, A-7	0	100	90-100	70-90	65-80	35-45	15-20
	3-14	Silty clay loam, silty clay, clay.	CL, CH	A-7	0-5	95-100	85-100	65-85	60-75	40-55	15-30
	14	Unweathered bedrock.	-	-	-	-	-	-	-	-	-
Cadoma-----	0-1	Silty clay loam	CL	A-7	0	100	90-100	85-95	75-90	40-45	15-20
	1-11	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	100	95-100	85-95	80-90	40-55	20-30
	11-34	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	100	95-100	85-95	80-90	40-55	20-30
	34	Unweathered bedrock.	-	-	-	-	-	-	-	-	-
Rock outcrop----											
168*:											
Orpha, moist----	0-3	Loamy fine sand	SM	A-2, A-4	0	100	95-100	80-90	25-35	0-20	NP
	3-38	Loamy fine sand, fine sand.	SM	A-2	0	100	95-100	80-90	25-35	0-20	NP
	38-60	Fine sand	SM	A-2	0	100	95-100	75-85	20-30	0-20	NP

Table 11.-Engineering Index Properties--Continued

(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 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index	
			Unified	AASHTO		4	10	40	200			
												In
174*:												
Phiferon-----	0-6	Fine sandy loam	SM	A-4	0	100	90-100	75-95	35-50	15-25	NP-5	
	6-16	Very fine sandy loam.	SM, ML	A-4	0	100	90-100	85-95	40-60	15-25	NP-5	
	16-26	Very fine sandy loam.	SM, ML	A-4	0	95-100	80-100	75-95	40-60	15-25	NP-5	
	26	Unweathered bedrock.	-	-	-	-	-	-	-	-	-	
Trelona-----	0-7	Fine sandy loam	SM	A-4	0	95-100	80-100	65-80	35-50	15-25	NP-5	
	7-14	Fine sandy loam, loamy very fine sand.	SM	A-4, A-2	0	95-100	80-100	60-80	30-50	15-25	NP-5	
	14	Unweathered bedrock.	-	-	-	-	-	-	-	-	-	
175----- Pierre	0-3	Silty clay	CH	A-7	0	100	100	90-100	85-95	55-75	35-50	
	3-32	Clay	CH	A-7	0	100	100	90-100	80-90	55-75	35-50	
	32	Unweathered bedrock.	-	-	-	-	-	-	-	-	-	
176*:												
Pierre-----	0-4	Clay	CH	A-7	0	100	100	90-100	80-90	55-75	35-50	
	4-34	Clay	CH	A-7	0	100	100	90-100	80-90	55-75	35-50	
	34	Unweathered bedrock.	-	-	-	-	-	-	-	-	-	
Grummit-----	0-4	Clay	CL, CH	A-7	0	90-100	80-100	75-100	70-95	45-65	20-35	
	4-11	Clay	CL, CH	A-7	0	90-100	80-100	75-100	70-95	45-65	20-35	
	11	Unweathered bedrock.	-	-	-	-	-	-	-	-	-	
177----- Recluse, dry	0-4	Loam	CL-ML, CL	A-4, A-6	0	100	90-100	70-90	50-70	25-35	5-15	
	4-23	Loam, clay loam	CL	A-6	0	100	85-100	70-90	60-80	30-40	10-20	
	23-60	Loam, very fine sandy loam.	SC-SM, CL-ML, SC, CL	A-4	0	95-100	85-100	70-90	45-60	25-30	5-10	
178*:												
Recluse-----	0-11	Loam	CL-ML, CL	A-4, A-6	0	100	90-100	70-90	50-70	25-35	5-15	
	11-29	Loam, clay loam	CL	A-6	0	100	85-100	70-90	60-80	30-40	10-20	
	29-60	Loam, very fine sandy loam.	SC-SM, CL-ML, SC, CL	A-4	0	95-100	85-100	70-90	45-60	25-30	5-10	
Cedak-----	0-4	Loam	CL-ML, SC-SM, SC, CL	A-4	0	100	90-100	70-85	45-60	25-30	5-10	
	4-15	Clay loam, loam	CL	A-6	0	100	90-100	75-95	60-80	30-40	10-20	
	15-29	Loam, very fine sandy loam.	ML, CL-ML, SM, SC-SM	A-4	0	100	90-100	70-85	45-65	20-30	NP-10	
	29	Unweathered bedrock.	-	-	-	-	-	-	-	-	-	
179*:												
Recluse-----	0-13	Loam	CL-ML, CL	A-4, A-6	0	100	90-100	70-90	50-70	25-35	5-15	
	13-23	Loam, clay loam	CL	A-6	0	100	85-100	70-90	60-80	30-40	10-20	
	23-60	Loam, very fine sandy loam.	SC-SM, CL-ML, SC, CL	A-4	0	95-100	85-100	70-90	45-60	25-30	5-10	

Table 11.—Engineering Index Properties--Continued

(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 3-10 inches	Percentage passing sieve number—				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
179*:(cont.)											
Cedak-----	0-8	Loam	CL-ML, SC-SM, SC, CL	A-4	0	100	90-100	70-85	45-60	25-30	5-10
	8-19	Clay loam, loam	CL	A-6	0	100	90-100	75-95	60-80	30-40	10-20
	19-32	Loam, very fine sandy loam.	ML, CL-ML, SM, SC-SM	A-4	0	100	90-100	70-85	45-65	20-30	NP-10
	32	Unweathered bedrock.	-	-	-	-	-	-	-	-	-
180*:											
Rhoame-----	0-3	Clay	CL, CH	A-7	0	95-100	85-100	80-95	70-90	45-65	20-35
	3-10	Clay	CL, CH	A-7	0	95-100	85-100	80-95	70-90	45-65	20-35
	10-60	Clay	CL, CH	A-7	0	95-100	85-100	80-95	70-90	45-65	20-35
Bahl-----	0-3	Clay	CL, CH	A-7	0	100	95-100	85-100	70-90	45-55	20-30
	3-60	Clay, silty clay	CL, CH	A-7	0	100	95-100	85-100	70-90	45-65	20-35
181*:											
Rock outcrop---											
182*:											
Rock outcrop---											
Tassel-----	0-3	Loamy fine sand	SM	A-2	0	95-100	85-100	65-80	15-25	0-20	NP
	3-11	Loamy fine sand	SM	A-2, A-4	0	90-100	80-100	60-85	15-45	0-25	NP
	11	Unweathered bedrock.	-	-	-	-	-	-	-	-	-
183-----	0-3	Clay	CL, CH	A-7	0	100	95-100	85-100	75-95	45-55	20-30
Samday	3-13	Clay, clay loam	CL, CH	A-7	0	100	90-100	85-95	75-90	40-55	20-30
	13	Unweathered bedrock.	-	-	-	-	-	-	-	-	-
184*:											
Samday-----	0-3	Clay	CL, CH	A-7	0	100	95-100	85-100	75-95	45-55	20-30
	3-18	Clay, clay loam	CL, CH	A-7	0	100	90-100	85-95	75-90	40-55	20-30
	18	Unweathered bedrock.	-	-	-	-	-	-	-	-	-
Pierre-----	0-4	Clay	CH	A-7	0	100	100	90-100	80-90	55-75	35-50
	4-32	Clay	CH	A-7	0	100	100	90-100	80-90	55-75	35-50
	32	Unweathered bedrock.	-	-	-	-	-	-	-	-	-
185*:											
Samday-----	0-3	Clay	CL, CH	A-7	0	100	95-100	85-100	75-95	45-55	20-30
	3-13	Clay, clay loam	CL, CH	A-7	0	100	90-100	85-95	75-90	40-55	20-30
	13	Unweathered bedrock.	-	-	-	-	-	-	-	-	-
Savageton-----	0-5	Clay loam	CL	A-7	0	100	95-100	75-95	60-80	40-45	20-25
	5-11	Silty clay, clay	CL, CH	A-7	0	100	90-100	85-95	80-90	45-65	20-35
	11-24	Clay, silty clay	CL, CH	A-7	0	100	90-100	85-95	80-90	45-65	20-35
	24	Unweathered bedrock.	-	-	-	-	-	-	-	-	-
Bahl-----	0-6	Clay loam	CL	A-7	0	100	95-100	85-100	70-90	40-45	20-25
	6-12	Clay loam, clay	CL, CH	A-7	0	100	95-100	85-100	70-90	40-55	20-30
	12-60	Clay, silty clay	CL, CH	A-7	0	100	95-100	85-100	70-90	45-65	20-35

Table 11.—Engineering Index Properties--Continued

(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 3-10 inches	Percentage passing sieve number—				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
186*: Savageton-----	0-5	Clay loam	CL	A-7	0	100	95-100	75-95	60-80	40-45	20-25
	5-11	Silty clay, clay	CL, CH	A-7	0	100	90-100	85-95	80-90	45-65	20-35
	11-24	Clay, silty clay	CL, CH	A-7	0	100	90-100	85-95	80-90	45-65	20-35
	24	Unweathered bedrock.	-	-	-	-	-	-	-	-	-
Bahl-----	0-1	Clay loam	CL	A-7	0	100	95-100	85-100	70-90	40-45	20-25
	1-14	Clay loam, clay	CL, CH	A-7	0	100	95-100	85-100	70-90	40-55	20-30
	14-60	Clay, silty clay	CL, CH	A-7	0	100	95-100	85-100	70-90	45-65	20-35
187*: Schamber-----	0-2	Gravelly loamy sand.	SM, SP-SM	A-1	0-10	70-80	55-75	25-40	5-20	0-20	NP
	2-60	Very gravelly sand, very gravelly loamy sand, extremely gravelly loamy sand.	GP-GM, GM, SP-SM, SM	A-1	0-30	40-60	25-50	10-25	0-15	0-20	NP
Tulloch-----	0-3	Loamy fine sand	SM	A-2	0	100	90-100	65-80	20-35	0-15	NP
	3-24	Loamy fine sand, loamy sand.	SM	A-2	0	95-100	85-100	65-80	15-30	0-15	NP
	24	Unweathered bedrock.	-	-	-	-	-	-	-	-	-
188----- Senlar	0-2	Silt loam	CL-ML	A-4	0	100	90-100	80-100	65-85	25-35	5-10
	2-16	Silt loam, silty clay loam.	CL	A-6	0	100	90-100	80-95	75-90	25-40	10-20
	16-28	Silt loam	CL-ML, CL	A-4, A-6	0	95-100	85-100	70-90	60-70	25-35	5-15
	28-60	Very fine sandy loam, silt loam.	CL-ML, CL	A-4, A-6	0	95-100	80-100	65-85	50-65	25-35	5-15
189*: Shingle-----	0-6	Loam	CL-ML, CL	A-4, A-6	0	95-100	90-100	70-90	60-80	25-35	5-15
	6-17	Loam, clay loam	CL	A-6	0	95-100	85-100	70-90	55-80	30-40	10-20
	17	Unweathered bedrock.	-	-	-	-	-	-	-	-	-
Rock outcrop----											
Samday-----	0-3	Clay	CL, CH	A-7	0	100	95-100	85-100	75-95	45-55	20-30
	3-14	Clay, clay loam	CL, CH	A-7	0	100	90-100	85-95	75-90	40-55	20-30
	14	Unweathered bedrock.	-	-	-	-	-	-	-	-	-
190----- Silhouette	0-2	Silt loam	CL	A-6	0	100	95-100	80-90	70-80	30-35	10-15
	2-15	Silty clay loam	CL	A-7	0	100	95-100	80-90	75-90	40-45	15-20
	15-60	Silty clay loam, silty clay.	CL, CH	A-7	0	100	95-100	80-95	75-90	40-55	20-30
191*: Skilak-----	0-3	Silty clay	CL	A-7	0	100	95-100	90-100	85-95	45-50	20-25
	3-7	Silty clay loam, silt loam.	CL	A-6	0	100	95-100	85-100	80-95	30-40	10-20
	7-60	Stratified very fine sandy loam to silty clay loam.	CL	A-6	0	100	95-100	85-100	80-95	30-40	10-20

Table 11.--Engineering Index Properties--Continued

(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 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index	
			Unified	AASHTO		4	10	40	200			
												In
212: (cont.)												
Vetal-----	0-24	Fine sandy loam	SM	A-4	0	100	95-100	75-95	35-50	15-25	NP-5	
	24-60	Fine sandy loam, very fine sandy loam.	SM	A-4	0	100	95-100	75-95	35-50	15-25	NP-5	
213-----	0-3	Clay loam	CL	A-6	0	100	90-100	85-95	60-80	35-40	15-20	
Ulm	3-15	Clay loam, clay	CL, CH	A-7	0	100	90-100	85-95	60-80	40-55	20-30	
	15-60	Clay loam, clay	CL, CH	A-7	0	100	90-100	85-95	60-80	40-55	20-30	
214*:												
Ulm-----	0-5	Loam	CL	A-6	0	100	90-100	85-95	60-80	30-35	10-15	
	5-24	Clay loam, clay	CL, CH	A-7	0	100	90-100	85-95	60-80	40-55	20-30	
	24-60	Clay loam, clay	CL, CH	A-7	0	100	90-100	85-95	60-80	40-55	20-30	
Bidman-----	0-3	Loam	CL	A-6	0	80-100	80-100	70-85	60-70	30-40	10-15	
	3-16	Clay, clay loam	CH	A-7	0	80-100	80-100	80-100	70-90	50-60	30-40	
	16-60	Clay loam, loam	CL	A-6, A-7	0	80-100	80-100	75-100	65-80	35-45	20-30	
215*:												
Ulm-----	0-5	Loam	CL	A-6	0	100	90-100	85-95	60-80	30-35	10-15	
	5-24	Clay loam, clay	CL, CH	A-7	0	100	90-100	85-95	60-80	40-55	20-30	
	24-60	Clay loam, clay	CL, CH	A-7	0	100	90-100	85-95	60-80	40-55	20-30	
Forkwood-----	0-3	Loam	CL-ML	A-4	0	85-100	85-100	70-90	50-70	20-30	5-10	
	3-18	Loam, clay loam	CL	A-6	0	85-100	85-100	70-90	55-75	30-40	10-20	
	18-23	Clay loam	CL	A-6	0	85-100	85-100	70-95	60-80	35-40	15-20	
	23-60	Loam, clay loam	CL	A-6	0	75-100	75-100	70-90	50-70	30-40	10-20	
216:-----												
Ustic Torriorthents												
217*:												
Ustic Torriorthents, cool-----												
Torriorthentic Haplustolls----												
Rock outcrop----												
218-----	0-24	Fine sandy loam	SM	A-4	0	100	95-100	75-95	35-50	15-25	NP-5	
Vetal	24-60	Fine sandy loam, very fine sandy loam.	SM	A-4	0	100	95-100	75-95	35-50	15-25	NP-5	
219-----	0-30	Fine sandy loam	SM	A-4	0	100	95-100	75-95	35-50	15-25	NP-5	
Vetal	30-60	Fine sandy loam, very fine sandy loam.	SM	A-4	0	100	95-100	75-95	35-50	15-25	NP-5	
220*:												
Vetal-----	0-32	Fine sandy loam	SM	A-4	0	100	95-100	75-95	35-50	15-25	NP-5	
	32-60	Fine sandy loam, very fine sandy loam.	SM	A-4	0	100	95-100	75-95	35-50	15-25	NP-5	

Table 11.--Engineering Index Properties--Continued

(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 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index	
			Unified	AASHTO		4	10	40	200			
												In
220: (cont.)												
Phiferson-----	0-6	Fine sandy loam	SM	A-4	0	100	90-100	75-95	35-50	15-25	NP-5	
	6-25	Fine sandy loam, very fine sandy loam.	SM	A-4	0	100	90-100	70-90	35-50	15-25	NP-5	
	25-33	Very fine sandy loam, loamy very fine sand.	SM	A-2, A-4	0	95-100	80-100	60-80	30-45	15-25	NP-5	
	33	Unweathered bedrock.	-	-	-	-	-	-	-	-	-	
221*:												
Vetal-----	0-24	Fine sandy loam	SM	A-4	0	100	95-100	75-95	35-50	15-25	NP-5	
	24-60	Fine sandy loam, very fine sandy loam.	SM	A-4	0	100	95-100	75-95	35-50	15-25	NP-5	
Phiferson-----	0-8	Fine sandy loam	SM	A-4	0	100	90-100	75-95	35-50	15-25	NP-5	
	8-23	Fine sandy loam, very fine sandy loam.	SM	A-4	0	100	90-100	70-90	35-50	15-25	NP-5	
	23-30	Fine sandy loam, very fine sandy loam.	SM	A-4	0	95-100	80-100	70-90	35-50	15-25	NP-5	
	30	Unweathered bedrock.	-	-	-	-	-	-	-	-	-	
222-----												
Vonalee	0-3	Sandy loam	SM	A-4	0	100	95-100	60-80	35-50	15-25	NP-5	
	3-32	Sandy loam, fine sandy loam.	SM, SC-SM	A-4	0	100	95-100	70-90	35-50	15-25	NP-5	
	32-60	Loamy fine sand, fine sandy loam	SM	A-2, A-4	0	100	95-100	70-90	30-50	15-25	NP-5	
223*:												
Vonalee-----	0-4	Fine sandy loam	SM	A-4	0	100	95-100	60-80	35-50	15-25	NP-5	
	4-17	Sandy loam, fine sandy loam.	SM, SC-SM	A-4	0	100	95-100	70-90	35-50	15-25	NP-5	
	17-60	Fine sandy loam, sandy loam.	SM	A-2, A-4	0	100	95-100	70-90	30-50	15-25	NP-5	
Keeline-----	0-2	Fine sandy loam	SM	A-2, A-4	0	100	95-100	60-75	30-45	15-25	NP-5	
	2-60	Sandy loam, fine sandy loam.	SM	A-2, A-4	0	100	95-100	55-75	20-40	15-25	NP-5	

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 12.-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	Moist	Permea-	Available	Soil	Salinity	Shrink-	Erosion factors		Wind	Organic
	In	Pct		bulk	bility	water	reaction		swell	K	T	erodi-	matter
			G/cc	density	In/hr	In/in	pH	mmhos/cm	potential			group	Pct
100*:													
Absted-----	0-2	12-18	1.25-1.35	2.0-6.0	0.12-0.14	6.6-7.8	0-2	Low-----	0.32	2	3	1-2	
	2-11	35-50	1.15-1.25	0.06-0.2	0.17-0.19	7.4-9.0	0-4	High-----	0.43				
	11-21	35-50	1.15-1.25	0.06-0.2	0.11-0.15	8.5-9.6	4-8	High-----	0.43				
	21-60	30-45	1.15-1.25	0.06-0.6	0.11-0.15	8.5-9.6	4-8	Moderate	0.43				
Arvada-----	0-2	12-20	1.35-1.45	2.0-6.0	0.12-0.14	7.4-8.4	0-4	Low-----	0.28	2	3	.5-1	
	2-16	35-50	1.25-1.45	0.00-0.06	0.08-0.10	8.5-9.6	0-4	High-----	0.37				
	16-60	30-50	1.25-1.45	0.06-0.2	0.09-0.12	8.5-9.6	2-8	High-----	0.37				
101*:													
Absted-----	0-5	15-25	1.15-1.25	0.6-2.0	0.15-0.17	6.6-7.8	0-2	Low-----	0.32	2	5	1-2	
	5-10	35-50	1.15-1.25	0.06-0.2	0.17-0.19	7.4-9.0	0-4	High-----	0.43				
	10-19	35-50	1.15-1.25	0.06-0.2	0.11-0.15	8.5-9.6	4-8	High-----	0.43				
	19-60	30-45	1.15-1.25	0.06-0.6	0.11-0.15	8.5-9.6	4-8	Moderate	0.43				
Cambria-----	0-3	15-25	1.15-1.25	0.6-2.0	0.15-0.18	6.6-7.8	0-0	Low-----	0.32	5	5	1-2	
	3-13	20-35	1.20-1.30	0.6-2.0	0.18-0.20	7.4-8.4	0-0	Moderate	0.43				
	13-60	18-30	1.20-1.35	0.6-2.0	0.16-0.19	7.9-9.0	0-2	Moderate	0.43				
102*:													
Albinas-----	0-10	15-25	1.30-1.40	0.6-2.0	0.16-0.18	6.6-7.3	0-0	Low-----	0.32	5	5	2-5	
	10-34	20-35	1.30-1.45	0.6-2.0	0.18-0.20	6.6-7.8	0-0	Moderate	0.32				
	34-60	12-20	1.35-1.45	0.6-2.0	0.14-0.16	7.9-8.4	0-0	Low-----	0.37				
Recluse-----	0-7	15-25	1.20-1.30	0.6-2.0	0.15-0.17	6.6-7.8	0-0	Low-----	0.32	5	5	2-3	
	7-24	20-35	1.25-1.35	0.6-2.0	0.17-0.20	6.6-7.8	0-0	Moderate	0.37				
	24-60	15-22	1.30-1.40	0.6-2.0	0.12-0.16	7.9-8.4	0-0	Low-----	0.32				
103*:													
Alice-----	0-9	9-18	1.25-1.35	2.0-6.0	0.12-0.15	6.6-7.8	0-0	Low-----	0.28	5	3	1-3	
	9-19	9-18	1.35-1.45	2.0-6.0	0.13-0.16	7.4-7.8	0-0	Low-----	0.32				
	19-60	8-18	1.40-1.50	2.0-6.0	0.12-0.15	7.4-8.4	0-0	Low-----	0.32				
Manter-----	0-9	7-13	1.25-1.35	2.0-6.0	0.12-0.15	6.6-7.8	0-0	Low-----	0.32	5	3	2-4	
	9-18	10-18	1.35-1.45	2.0-6.0	0.12-0.15	6.6-7.8	0-0	Low-----	0.37				
	18-60	6-14	1.50-1.60	2.0-6.0	0.12-0.15	7.9-8.4	0-0	Low-----	0.37				
104*:													
Alice-----	0-13	9-18	1.25-1.35	2.0-6.0	0.12-0.15	6.6-7.8	0-0	Low-----	0.28	5	3	1-3	
	13-28	9-18	1.35-1.45	2.0-6.0	0.13-0.16	7.4-7.8	0-0	Low-----	0.32				
	28-60	8-18	1.40-1.50	2.0-6.0	0.12-0.15	7.4-8.4	0-0	Low-----	0.32				
Phiferson-----	0-8	8-16	1.30-1.40	2.0-6.0	0.12-0.15	6.6-7.8	0-0	Low-----	0.28	3	3	1-3	
	8-23	8-16	1.35-1.45	2.0-6.0	0.14-0.16	6.6-7.8	0-0	Low-----	0.24				
	23-30	6-16	1.35-1.45	2.0-6.0	0.13-0.15	7.9-8.4	0-0	Low-----	0.32				
	30	---	---	---	---	---	---	---	---				
105*:-													
Badland													
106-----	0-5	40-50	1.05-1.15	0.06-0.2	0.14-0.16	7.4-8.4	0-2	High-----	0.32	5	4	1-2	
Bahl	5-60	40-55	1.15-1.25	0.06-0.2	0.14-0.16	7.9-9.0	0-4	High-----	0.37				
107*:													
Bahl-----	0-5	40-50	1.05-1.15	0.06-0.2	0.14-0.16	7.4-8.4	0-2	High-----	0.32	5	4	1-2	
	5-60	40-55	1.15-1.25	0.06-0.2	0.14-0.16	7.9-9.0	0-4	High-----	0.37				

Table 12.-Physical and Chemical Properties of the Soils--Continued

(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 	Moist bulk density	Permea- bility	Available water capacity	Soil reaction pH	Salinity mmhos/cm	Shrink- swell potential	Erosion factors		Wind erodi- bility group	Organic matter Pct
	In	Pct								G/cc	In/hr		
107*:(cont).													
Petrie-----	0-3	40-50	1.15-1.25	0.06-0.2	0.11-0.13	8.5-9.6	2-4	High-----	0.37	5	4	.5-1	
	3-60	35-55	1.15-1.35	0.00-0.06	0.11-0.14	8.5-9.6	4-8	High-----	0.49				
108-----	0-8	10-18	1.25-1.35	2.0-6.0	0.12-0.14	6.6-7.8	0-0	Low-----	0.28	5	3	2-4	
Bayard	8-60	8-18	1.35-1.45	2.0-6.0	0.12-0.14	7.4-8.4	0-0	Low-----	0.32				
109*:													
Bidman-----	0-4	15-27	1.15-1.25	0.6-2.0	0.17-0.19	6.6-7.8	0-0	Moderate	0.32	5	6	1-2	
	4-12	35-50	1.20-1.30	0.06-0.2	0.14-0.16	6.6-7.8	0-0	High-----	0.37				
	12-60	25-35	1.25-1.35	0.2-0.6	0.19-0.21	7.9-9.0	0-2	High-----	0.43				
Slickspots-----													
110*:													
Brownrigg-----	0-3	12-20	1.15-1.25	0.6-2.0	0.10-0.12	7.4-8.4	0-2	Low-----	0.10	2	8	2-3	
	3-8	24-35	1.25-1.35	0.2-0.6	0.10-0.12	7.4-8.4	0-2	Moderate	0.10				
	8-15	12-25	1.25-1.35	2.0-6.0	0.06-0.08	7.9-8.4	0-2	Low-----	0.10				
	15	---	---	---	---	---	---	-----	---				
Featherlegs-----	0-5	8-12	1.15-1.25	0.6-2.0	0.16-0.18	6.6-7.8	0-2	Low-----	0.37	4	5	1-3	
	5-23	22-35	1.25-1.35	0.2-0.6	0.19-0.21	7.4-8.4	0-2	Moderate	0.43				
	23-38	10-20	1.15-1.25	0.6-2.0	0.16-0.18	7.9-9.0	0-2	Low-----	0.43				
	38-60	5-12	1.25-1.35	>20	0.03-0.05	7.9-8.4	0-2	Low-----	0.05				
Wolf-----	0-4	15-23	1.15-1.25	0.6-2.0	0.16-0.17	7.4-7.8	<2	Low-----	0.32	4	5	1-3	
	4-18	18-35	1.25-1.35	0.6-2.0	0.17-0.19	6.6-7.8	<2	Moderate	0.37				
	18-37	15-30	1.30-1.40	0.6-2.0	0.16-0.18	7.9-9.0	<2	Low-----	0.37				
	37-60	0-5	1.40-1.50	>20	0.04-0.06	7.9-8.4	<2	Low-----	0.05				
111*:													
Bumbob-----	0-3	55-65	1.05-1.15	0.00-0.06	0.13-0.15	5.1-6.0	0-2	High-----	0.37	5	4	1-2	
	3-19	60-70	1.15-1.25	0.00-0.06	0.13-0.15	3.6-5.5	0-2	High-----	0.37				
	19-60	60-75	1.15-1.25	0.00-0.06	0.13-0.15	3.6-5.0	0-2	High-----	0.37				
Rhoame-----	0-2	40-60	1.15-1.30	0.06-0.2	0.14-0.16	6.1-7.8	0-0	High-----	0.32	5	4	1-2	
	2-60	40-60	1.15-1.30	0.06-0.2	0.14-0.16	6.1-7.3	0-0	High-----	0.37				
112*:													
Busher-----	0-5	5-10	1.40-1.50	2.0-6.0	0.10-0.12	6.1-7.3	0-0	Low-----	0.24	4	2	1-3	
	5-54	5-10	1.40-1.50	2.0-6.0	0.08-0.12	6.6-7.8	0-0	Low-----	0.24				
	54	---	---	0.2-0.6	---	---	---	-----	---				
Phiferson-----	0-10	6-10	1.35-1.45	2.0-6.0	0.10-0.12	6.6-7.8	0-0	Low-----	0.24	3	2	1-3	
	10-23	6-14	1.35-1.45	2.0-6.0	0.12-0.15	7.4-7.8	0-0	Low-----	0.32				
	23	---	---	---	---	---	---	-----	---				
113-----	0-3	35-40	1.05-1.15	0.06-0.2	0.18-0.20	7.9-9.0	0-4	Moderate	0.37	3	7	1-2	
Cadoma	3-11	35-50	1.20-1.30	0.06-0.2	0.12-0.15	8.5-9.6	4-8	High-----	0.43				
	11-28	35-50	1.20-1.30	0.06-0.2	0.10-0.12	7.9-9.6	4-8	High-----	0.43				
	28	---	---	---	---	---	---	-----	---				
114*:													
Cedak-----	0-8	15-22	1.15-1.25	0.6-2.0	0.16-0.18	6.6-7.8	0-0	Low-----	0.32	3	5	2-4	
	8-19	18-35	1.25-1.40	0.6-2.0	0.17-0.20	6.6-7.8	0-0	Moderate	0.37				
	19-32	12-22	1.25-1.40	0.6-2.0	0.15-0.17	7.9-9.0	0-0	Low-----	0.43				
	32	---	---	---	---	---	---	-----	---				

Table 12.-Physical and Chemical Properties of the Soils--Continued

(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 G/cc	Moist bulk density	Permeability In/hr	Available water capacity In/in	Soil reaction pH	Salinity mmhos/cm	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter Pct
	In	Pct								K	T		
123*, 124*:													
Featherlegs-----	0-5	8-12	1.15-1.25	0.6-2.0	0.16-0.18	6.6-7.8	0-2	Low-----	0.37	4	5	1-3	
	5-23	22-35	1.25-1.35	0.2-0.6	0.19-0.21	7.4-8.4	0-2	Moderate	0.43				
	23-38	10-20	1.15-1.25	0.6-2.0	0.16-0.18	7.9-9.0	0-2	Low-----	0.43				
	38-60	5-12	1.25-1.35	>20	0.03-0.05	7.9-8.4	0-2	Low-----	0.05				
Wolf-----	0-4	15-23	1.15-1.25	0.6-2.0	0.16-0.17	7.4-7.8	<2	Low-----	0.32	4	5	1-3	
	4-18	18-35	1.25-1.35	0.6-2.0	0.17-0.19	6.6-7.8	<2	Moderate	0.37				
	18-32	15-30	1.30-1.40	0.6-2.0	0.16-0.18	7.9-9.0	<2	Low-----	0.37				
	32-60	0-5	1.40-1.50	>20	0.04-0.06	7.9-8.4	<2	Low-----	0.05				
125*:													
Featherlegs-----	0-5	8-12	1.15-1.25	0.6-2.0	0.16-0.18	6.6-7.8	0-2	Low-----	0.37	4	5	1-3	
	5-23	22-35	1.25-1.35	0.2-0.6	0.19-0.21	7.4-8.4	0-2	Moderate	0.43				
	23-38	10-20	1.15-1.25	0.6-2.0	0.16-0.18	7.9-9.0	0-2	Low-----	0.43				
	38-60	5-12	1.25-1.35	>20	0.03-0.05	7.9-8.4	0-2	Low-----	0.05				
Wolf-----	0-4	15-23	1.15-1.25	0.6-2.0	0.16-0.17	7.4-7.8	<2	Low-----	0.32	4	5	1-3	
	4-18	18-35	1.25-1.35	0.6-2.0	0.17-0.19	6.6-7.8	<2	Moderate	0.37				
	18-32	15-30	1.30-1.40	0.6-2.0	0.16-0.18	7.9-9.0	<2	Low-----	0.37				
	32-60	0-5	1.40-1.50	>20	0.04-0.06	7.9-8.4	<2	Low-----	0.05				
Brownrigg-----	0-3	12-20	1.15-1.25	0.6-2.0	0.10-0.12	7.4-8.4	0-2	Low-----	0.10	2	8	2-3	
	3-8	24-35	1.25-1.35	0.2-0.6	0.10-0.12	7.4-8.4	0-2	Moderate	0.10				
	8-15	12-25	1.25-1.35	2.0-6.0	0.06-0.08	7.9-8.4	0-2	Low-----	0.10				
	15	---	---	---	---	---	---	-----	---				
126*:													
Forkwood-----	0-5	14-22	1.15-1.25	0.6-2.0	0.15-0.17	6.6-7.8	0-0	Low-----	0.32	5	5	1-2	
	5-12	25-35	1.25-1.35	0.6-2.0	0.17-0.20	6.6-7.8	0-0	Moderate	0.37				
	12-20	28-35	1.25-1.35	0.6-2.0	0.17-0.20	7.4-8.4	0-0	Moderate	0.37				
	20-60	14-24	1.35-1.45	2.0-6.0	0.15-0.17	7.9-9.0	0-2	Low-----	0.24				
Cambria-----	0-3	15-25	1.15-1.25	0.6-2.0	0.15-0.18	6.6-7.8	0-0	Low-----	0.32	5	5	1-2	
	3-9	20-35	1.20-1.30	0.6-2.0	0.18-0.20	7.4-8.4	0-0	Moderate	0.43				
	9-14	18-30	1.20-1.35	0.6-2.0	0.16-0.19	7.9-9.0	0-2	Moderate	0.43				
	14-60	12-22	1.30-1.45	2.0-6.0	0.13-0.16	7.9-9.0	0-2	Low-----	0.37				
127*:													
Forkwood-----	0-2	14-22	1.15-1.25	0.6-2.0	0.15-0.17	6.6-7.8	0-0	Low-----	0.32	5	5	1-2	
	2-11	25-35	1.25-1.35	0.6-2.0	0.17-0.20	6.6-7.8	0-0	Moderate	0.37				
	11-17	20-30	1.25-1.35	0.6-2.0	0.13-0.16	7.9-9.0	0-2	Low-----	0.32				
	17-60	14-24	1.35-1.45	2.0-6.0	0.15-0.17	7.9-9.0	0-2	Low-----	0.24				
Cambria-----	0-2	15-25	1.15-1.25	0.6-2.0	0.15-0.18	6.6-7.8	0-0	Low-----	0.32	5	5	1-2	
	2-10	20-35	1.20-1.30	0.6-2.0	0.18-0.20	7.4-8.4	0-0	Moderate	0.43				
	10-32	18-30	1.20-1.35	0.6-2.0	0.16-0.19	7.9-9.0	0-2	Moderate	0.43				
	32-60	12-22	1.30-1.45	2.0-6.0	0.13-0.16	7.9-9.0	0-2	Low-----	0.37				
Cushman-----	0-3	15-25	1.20-1.30	0.6-2.0	0.17-0.19	6.6-7.8	0-0	Low-----	0.32	3	5	1-2	
	3-15	20-35	1.25-1.35	0.6-2.0	0.18-0.20	7.4-8.4	0-0	Moderate	0.37				
	15-30	15-30	1.30-1.40	0.6-2.0	0.16-0.18	7.9-9.0	0-2	Low-----	0.37				
	30	---	---	---	---	---	---	-----	---				
128*:													
Forkwood-----	0-4	14-22	1.15-1.25	0.6-2.0	0.15-0.17	6.6-7.8	0-0	Low-----	0.32	5	5	1-2	
	4-21	25-35	1.25-1.35	0.6-2.0	0.17-0.20	6.6-7.8	0-0	Moderate	0.37				
	21-60	14-24	1.35-1.45	2.0-6.0	0.15-0.17	7.9-9.0	0-2	Low-----	0.24				

Table 12.-Physical and Chemical Properties of the Soils--Continued

(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	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
									K	T		
	In	Pct	G/cc	In/hr	In/in	pH	mmhos/cm					Pct
128* (cont.)												
Cushman-----	0-2	15-25	1.20-1.30	0.6-2.0	0.17-0.19	6.6-7.8	0-0	Low-----	0.32	3	5	1-2
	2-12	20-35	1.25-1.35	0.6-2.0	0.18-0.20	7.4-8.4	0-0	Moderate	0.37			
	12-34	15-30	1.30-1.40	0.6-2.0	0.16-0.18	7.9-9.0	0-2	Low-----	0.37			
	34	---	---	---	---	---	---	-----	---			
Terro-----	0-8	5-12	1.25-1.35	2.0-6.0	0.13-0.15	6.6-7.8	0-0	Low-----	0.28	3	3	1-3
	8-24	10-18	1.35-1.45	2.0-6.0	0.13-0.16	6.6-7.8	0-0	Low-----	0.28			
	24-36	8-15	1.40-1.50	2.0-6.0	0.10-0.15	7.4-9.0	0-0	Low-----	0.32			
	36	---	---	---	---	---	---	-----	---			
129*:												
Grummit, cool---	0-2	35-40	1.15-1.25	0.2-0.6	0.17-0.19	4.5-5.5	<2	Moderate	0.37	2	6	1-2
	2-14	40-60	1.05-1.15	0.06-0.2	0.14-0.16	3.6-5.5	<2	High-----	0.43			
	14	---	---	---	---	---	---	-----	---			
Rock outcrop---												
130*:												
Grummit-----	0-3	40-60	1.05-1.15	0.2-0.6	0.14-0.16	4.5-5.5	<2	High-----	0.37	2	4	1-2
	3-16	40-60	1.05-1.15	0.06-0.2	0.14-0.16	3.6-5.5	<2	High-----	0.43			
	16	---	---	---	---	---	---	-----	---			
Rock outcrop.												
131*:												
Grummit-----	0-3	40-60	1.05-1.15	0.2-0.6	0.14-0.16	4.5-5.5	<2	High-----	0.37	2	4	1-2
	3-15	40-60	1.05-1.15	0.06-0.2	0.14-0.16	3.6-5.5	<2	High-----	0.43			
	15	---	---	---	---	---	---	-----	---			
Hilight-----	0-3	40-55	1.15-1.30	0.06-0.2	0.14-0.16	6.1-7.8	0-0	High-----	0.43	2	4	1-3
	3-19	40-55	1.15-1.30	0.06-0.2	0.14-0.16	6.1-7.8	0-0	High-----	0.43			
	19	---	---	---	---	---	---	-----	---			
132*:												
Grummit-----	0-3	40-60	1.05-1.15	0.2-0.6	0.14-0.16	4.5-5.5	<2	High-----	0.37	2	4	1-2
	3-14	40-60	1.05-1.15	0.06-0.2	0.14-0.16	3.6-5.5	<2	High-----	0.43			
	14	---	---	---	---	---	---	-----	---			
Hilight-----	0-4	30-40	1.25-1.40	0.06-0.2	0.19-0.21	6.1-7.8	0-0	Moderate	0.32	2	6	1-3
	4-16	40-55	1.15-1.30	0.06-0.2	0.14-0.16	6.1-7.8	0-0	High-----	0.43			
	16	---	---	---	---	---	---	-----	---			
Rock outcrop---												
133*:												
Hargreave-----	0-5	8-18	1.25-1.35	2.0-6.0	0.12-0.15	6.6-7.8	0-0	Low-----	0.32	3	3	2-4
	5-20	20-35	1.25-1.35	0.6-2.0	0.14-0.18	6.6-7.8	0-0	Moderate	0.37			
	20-30	8-18	1.35-1.45	2.0-6.0	0.12-0.16	7.4-8.4	0-0	Low-----	0.43			
	30	---	---	---	---	---	---	-----	---			
Cedak-----	0-8	10-17	1.25-1.35	2.0-6.0	0.13-0.15	6.6-7.8	0-0	Low-----	0.28	3	3	2-4
	8-19	18-35	1.25-1.40	0.6-2.0	0.17-0.20	6.6-7.8	0-0	Moderate	0.37			
	19-30	12-22	1.25-1.40	0.6-2.0	0.15-0.17	7.9-9.0	0-0	Low-----	0.43			
	30	---	---	---	---	---	---	-----	---			

Table 12.-Physical and Chemical Properties of the Soils--Continued

(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 	Moist bulk density	Permea- bility In/hr	Available water In/in capacity	Soil reaction pH	Salinity mmhos/cm	Shrink- swell potential	Erosion factors K T		Wind erodi- bility group	Organic matter Pct
	In	Pct								G/cc	In/hr		
134*:													
Hargreave-----	0-5	8-18	1.25-1.35	2.0-6.0	0.12-0.15	6.6-7.8	0-0	Low-----	0.32	3	3	2-4	
	5-19	20-35	1.25-1.35	0.6-2.0	0.14-0.18	6.6-7.8	0-0	Moderate	0.37				
	19-26	8-18	1.35-1.45	2.0-6.0	0.12-0.16	7.4-8.4	0-0	Low-----	0.43				
	26	---	---	---	---	---	---	-----	---				
Lambman-----	0-4	15-25	1.15-1.25	0.6-2.0	0.17-0.19	6.1-7.3	0-0	Low-----	0.32	2	5	1-3	
	4-17	20-35	1.25-1.35	0.6-2.0	0.16-0.20	6.6-7.8	0-0	Moderate	0.37				
	17	---	---	---	---	---	---	-----	---				
135*:													
Hargreave-----	0-5	8-18	1.25-1.35	2.0-6.0	0.12-0.15	6.6-7.8	0-0	Low-----	0.32	3	3	2-4	
	5-25	20-35	1.25-1.35	0.6-2.0	0.14-0.18	6.6-7.8	0-0	Moderate	0.37				
	25-38	8-18	1.35-1.45	2.0-6.0	0.12-0.16	7.4-8.4	0-0	Low-----	0.43				
	38	---	---	---	---	---	---	-----	---				
Noden-----	0-15	8-16	1.25-1.35	2.0-6.0	0.12-0.15	6.6-7.3	0-0	Low-----	0.28	5	3	2-3	
	15-36	20-35	1.25-1.35	0.6-2.0	0.17-0.20	6.6-7.8	0-0	Moderate	0.37				
	36-60	8-18	1.35-1.45	2.0-6.0	0.12-0.15	6.6-7.8	0-0	Low-----	0.43				
136-----	0-9	18-25	1.30-1.40	0.6-2.0	0.17-0.19	7.4-8.4	0-2	Low-----	0.37	5	5	1-2	
Haverdad, overflow	9-60	20-35	1.30-1.45	0.6-2.0	0.17-0.20	7.9-9.0	0-4	Moderate	0.43				
137*:													
Haverdad-----	0-4	18-25	1.30-1.40	0.6-2.0	0.17-0.19	7.4-8.4	0-2	Low-----	0.37	5	5	1-2	
	4-60	20-35	1.30-1.45	0.6-2.0	0.17-0.20	7.9-9.0	0-4	Moderate	0.43				
Clarkelen-----	0-3	6-15	1.25-1.35	2.0-6.0	0.14-0.16	7.4-8.4	0-0	Low-----	0.24	5	3	1-2	
	3-60	5-15	1.45-1.55	2.0-6.0	0.06-0.10	7.9-9.0	0-0	Low-----	0.28				
138*:													
Haverdad, saline	0-5	18-27	1.15-1.25	0.6-2.0	0.14-0.16	7.4-8.4	0-4	Low-----	0.32	5	5	1-2	
	5-28	20-35	1.15-1.25	0.6-2.0	0.14-0.16	7.9-8.4	2-8	Moderate	0.37				
	28-60	24-35	1.20-1.30	0.6-2.0	0.08-0.10	7.9-9.0	4-8	Moderate	0.37				
Clarkelen, saline-----	0-2	12-18	1.25-1.35	2.0-6.0	0.15-0.17	7.4-8.4	0-4	Low-----	0.32	5	3	1-2	
	2-60	8-18	1.40-1.50	2.0-6.0	0.06-0.08	7.9-9.0	4-8	Low-----	0.28				
139-----	0-9	8-18	1.25-1.35	2.0-6.0	0.10-0.12	6.6-7.3	0-0	Low-----	0.20	5	3	1-2	
Hiland	9-28	18-35	1.25-1.35	0.6-2.0	0.13-0.16	6.6-7.8	0-2	Moderate	0.32				
	28-60	8-18	1.35-1.45	2.0-6.0	0.09-0.13	7.9-9.0	0-4	Low-----	0.20				
140*:													
Hiland-----	0-9	8-18	1.25-1.35	2.0-6.0	0.10-0.12	6.6-7.3	0-0	Low-----	0.20	5	3	1-2	
	9-28	18-35	1.25-1.35	0.6-2.0	0.13-0.16	6.6-7.8	0-2	Moderate	0.32				
	28-40	18-32	1.30-1.45	2.0-6.0	0.11-0.14	7.9-8.4	0-4	Low-----	0.28				
	40-60	8-18	1.35-1.45	2.0-6.0	0.09-0.13	7.9-9.0	0-4	Low-----	0.20				
Bowbac-----	0-3	10-18	1.25-1.35	0.6-6.0	0.12-0.14	6.6-7.8	0-2	Low-----	0.28	3	3	1-2	
	3-19	20-35	1.25-1.40	0.6-2.0	0.15-0.17	6.6-8.4	0-2	Moderate	0.32				
	19-35	12-20	1.25-1.40	2.0-6.0	0.13-0.15	7.9-9.0	0-2	Low-----	0.32				
	35	---	---	---	---	---	---	-----	---				

Table 12.-Physical and Chemical Properties of the Soils--Continued

(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	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH	mmhos/cm			K	T		Pct
141*:													
Hiland-----	0-10	8-18	1.25-1.35	2.0-6.0	0.12-0.14	6.6-7.3	0-0	Low-----	0.28	5	3		1-2
	10-21	18-35	1.25-1.35	0.6-2.0	0.13-0.16	6.6-7.8	0-2	Moderate	0.32				
	21-60	8-18	1.35-1.45	2.0-6.0	0.09-0.13	7.9-9.0	0-4	Low-----	0.20				
Bowbac-----	0-7	10-18	1.25-1.35	0.6-6.0	0.12-0.14	6.6-7.8	0-2	Low-----	0.28	3	3		1-2
	7-18	20-35	1.25-1.40	0.6-2.0	0.15-0.17	6.6-8.4	0-2	Moderate	0.32				
	18-33	12-20	1.25-1.40	2.0-6.0	0.13-0.15	7.9-9.0	0-2	Low-----	0.32				
	33	---	---	---	---	---	---	-----	-----				
142*:													
Hilight-----	0-2	40-55	1.15-1.30	0.06-0.2	0.14-0.16	6.1-7.8	0-0	High-----	0.43	2	4		1-3
	2-10	40-55	1.15-1.30	0.06-0.2	0.14-0.16	6.1-7.8	0-0	High-----	0.43				
	10	---	---	---	---	---	---	-----	-----				
Rock outcrop----													
143*:													
Hilight-----	0-2	40-55	1.15-1.30	0.06-0.2	0.14-0.16	6.1-7.8	0-0	High-----	0.43	2	4		1-3
	2-19	40-55	1.15-1.30	0.06-0.2	0.14-0.16	6.1-7.8	0-0	High-----	0.43				
	19	---	---	---	---	---	---	-----	-----				
Savageton-----	0-4	40-50	1.15-1.25	0.06-0.2	0.14-0.16	6.6-8.4	0-0	High-----	0.28	3	4		1-3
	4-14	40-60	1.25-1.35	0.06-0.2	0.14-0.16	7.4-9.0	2-4	High-----	0.37				
	14-28	40-60	1.25-1.35	0.06-0.2	0.14-0.16	7.4-9.0	2-4	High-----	0.37				
	28	---	---	---	---	---	---	-----	-----				
144*:													
Jayem-----	0-11	8-16	1.25-1.35	2.0-6.0	0.12-0.16	6.6-7.3	0-0	Low-----	0.32	5	3		1-2
	11-25	8-16	1.35-1.45	2.0-6.0	0.12-0.16	6.6-7.8	0-0	Low-----	0.32				
	25-60	8-16	1.35-1.45	2.0-6.0	0.12-0.16	6.6-7.8	0-0	Low-----	0.37				
Julesburg-----	0-16	8-14	1.30-1.40	2.0-6.0	0.12-0.14	6.6-7.3	0-0	Low-----	0.20	5	3		1-3
	16-26	12-18	1.30-1.40	2.0-6.0	0.12-0.15	6.6-7.8	0-0	Low-----	0.20				
	26-32	6-14	1.40-1.50	2.0-6.0	0.09-0.13	6.6-7.8	0-0	Low-----	0.20				
	32-60	6-14	1.40-1.50	2.0-6.0	0.07-0.09	6.6-7.8	0-0	Low-----	0.20				
145*:													
Jayem-----	0-11	8-16	1.25-1.35	2.0-6.0	0.12-0.16	6.6-7.3	0-0	Low-----	0.32	5	3		1-2
	11-23	8-16	1.35-1.45	2.0-6.0	0.12-0.16	6.6-7.8	0-0	Low-----	0.32				
	23-60	8-16	1.35-1.45	2.0-6.0	0.12-0.16	6.6-7.8	0-0	Low-----	0.37				
Julesburg-----	0-10	8-14	1.30-1.40	2.0-6.0	0.12-0.14	6.6-7.3	0-0	Low-----	0.20	5	3		1-3
	10-26	12-18	1.30-1.40	2.0-6.0	0.12-0.15	6.6-7.8	0-0	Low-----	0.20				
	26-60	6-14	1.40-1.50	2.0-6.0	0.09-0.13	6.6-7.8	0-0	Low-----	0.20				
146*:													
Jayem-----	0-10	8-16	1.25-1.35	2.0-6.0	0.12-0.16	6.6-7.3	0-0	Low-----	0.32	5	3		1-2
	10-22	8-16	1.35-1.45	2.0-6.0	0.12-0.16	6.6-7.8	0-0	Low-----	0.32				
	22-60	8-16	1.35-1.45	2.0-6.0	0.12-0.16	6.6-7.8	0-0	Low-----	0.37				
Phiferson-----	0-4	8-16	1.30-1.40	2.0-6.0	0.12-0.15	6.6-7.8	0-0	Low-----	0.28	3	3		1-3
	4-11	8-16	1.35-1.45	2.0-6.0	0.14-0.16	6.6-7.8	0-0	Low-----	0.24				
	11-25	6-16	1.35-1.45	2.0-6.0	0.13-0.15	7.9-8.4	0-0	Low-----	0.32				
	25	---	---	---	---	---	---	-----	-----				

Table 12.-Physical and Chemical Properties of the Soils--Continued

(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	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
	In	Pct								K	T		
146*:(cont.)													
Trelona-----	0-10	6-15	1.25-1.35	2.0-6.0	0.13-0.15	6.6-7.8	0-0	Low-----	0.28	2	3	1-3	
	10-19	6-15	1.35-1.50	2.0-6.0	0.11-0.15	6.6-7.8	0-0	Low-----	0.37				
	19	---	---	---	---	---	---	-----	---				
147-----	0-4	8-18	1.25-1.35	2.0-6.0	0.14-0.16	6.6-8.4	0-2	Low-----	0.24	5	3	1-2	
Keeline	4-60	6-18	1.35-1.45	2.0-6.0	0.13-0.16	7.9-9.0	0-4	Low-----	0.28				
148-----	0-2	8-18	1.25-1.35	2.0-6.0	0.14-0.16	6.6-8.4	0-2	Low-----	0.24	5	3	1-2	
Keeline	2-60	6-18	1.35-1.45	2.0-6.0	0.13-0.16	7.9-9.0	0-4	Low-----	0.28				
149*:													
Keeline-----	0-3	8-18	1.25-1.35	2.0-6.0	0.12-0.14	6.6-8.4	0-2	Low-----	0.20	5	3	1-2	
	3-60	6-18	1.35-1.45	2.0-6.0	0.13-0.16	7.9-9.0	0-4	Low-----	0.28				
Kishona-----	0-5	15-25	1.15-1.25	0.6-2.0	0.14-0.17	7.4-8.4	0-2	Low-----	0.28	5	5	1-2	
	5-60	20-35	1.25-1.35	0.6-2.0	0.16-0.19	7.9-9.0	0-4	Moderate	0.37				
150*:													
Keeline-----	0-6	8-18	1.25-1.35	2.0-6.0	0.14-0.16	6.6-8.4	0-2	Low-----	0.24	5	3	1-2	
	6-60	6-18	1.35-1.45	2.0-6.0	0.13-0.16	7.9-9.0	0-4	Low-----	0.28				
Kishona-----	0-3	15-25	1.15-1.25	0.6-2.0	0.14-0.17	7.4-8.4	0-2	Low-----	0.28	5	5	1-2	
	3-60	20-35	1.25-1.35	0.6-2.0	0.16-0.19	7.9-9.0	0-4	Moderate	0.37				
Theedle-----	0-4	18-27	1.15-1.25	0.6-2.0	0.16-0.18	6.6-8.4	0-0	Low-----	0.32	3	4L	1-2	
	4-30	20-35	1.25-1.35	0.6-2.0	0.16-0.20	7.4-9.0	0-4	Moderate	0.37				
	30	---	---	---	---	---	---	-----	---				
151*:													
Keyner-----	0-5	8-15	1.25-1.35	2.0-6.0	0.14-0.17	6.6-8.4	0-0	Low-----	0.28	5	3	1-3	
	5-15	25-32	1.25-1.40	0.6-2.0	0.08-0.10	7.9-9.0	2-8	Moderate	0.32				
	15-42	29-35	1.15-1.40	0.6-2.0	0.10-0.12	7.9-9.6	8-16	Moderate	0.32				
	42-60	5-12	1.15-1.35	0.6-2.0	0.08-0.10	7.9-9.0	8-16	Low-----	0.32				
Slickspots-----													
152-----	0-2	28-35	1.05-1.15	0.6-2.0	0.14-0.17	7.4-8.4	0-2	Moderate	0.43	5	4L	5-1	
Kishona, sodic	2-14	28-35	1.15-1.25	0.6-2.0	0.12-0.15	7.9-9.0	2-4	Moderate	0.49				
	14-60	28-35	1.15-1.25	0.2-0.6	0.12-0.15	8.5-9.6	2-8	Moderate	0.49				
153*:													
Kishona-----	0-4	15-25	1.15-1.25	0.6-2.0	0.14-0.17	7.4-8.4	0-2	Low-----	0.28	5	5	1-2	
	4-60	20-35	1.25-1.35	0.6-2.0	0.16-0.19	7.9-9.0	0-4	Moderate	0.37				
Cambria-----	0-4	15-25	1.15-1.25	0.6-2.0	0.15-0.18	6.6-7.8	0-0	Low-----	0.32	5	5	1-2	
	4-10	20-35	1.20-1.30	0.6-2.0	0.18-0.20	7.4-8.4	0-0	Moderate	0.43				
	10-31	18-30	1.20-1.35	0.6-2.0	0.16-0.19	7.9-9.0	0-2	Moderate	0.43				
	31-60	12-22	1.30-1.45	2.0-6.0	0.13-0.16	7.9-9.0	0-2	Low-----	0.37				
154*:													
Kishona-----	0-5	15-25	1.15-1.25	0.6-2.0	0.14-0.17	7.4-8.4	0-2	Low-----	0.28	5	5	1-2	
	5-60	20-35	1.25-1.35	0.6-2.0	0.16-0.19	7.9-9.0	0-4	Moderate	0.37				
Cambria-----	0-5	15-25	1.15-1.25	0.6-2.0	0.15-0.18	6.6-7.8	0-0	Low-----	0.32	5	5	1-2	
	5-10	20-35	1.20-1.30	0.6-2.0	0.18-0.20	7.4-8.4	0-0	Moderate	0.43				
	10-60	18-30	1.20-1.35	0.6-2.0	0.16-0.19	7.9-9.0	0-2	Moderate	0.43				

Table 12.-Physical and Chemical Properties of the Soils--Continued

(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	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
	In	Pct		G/cc	In/hr	In/in	pH	mmhos/cm		K	T		Pct
154* (cont.)													
Theedle-----	0-4	18-27	1.15-1.25	0.6-2.0	0.16-0.18	6.6-8.4	0-0	Low-----	0.32	3	4L	1-2	
	4-30	20-35	1.25-1.35	0.6-2.0	0.16-0.20	7.4-9.0	0-4	Moderate	0.37				
	30	---	---	---	---	---	---	-----	-----				
155-----	0-8	8-18	1.40-1.55	2.0-6.0	0.13-0.18	7.4-8.4	0-4	Low-----	0.24	5	3	.5-2	
Las Animas	8-60	8-18	1.50-1.70	2.0-6.0	0.12-0.18	7.4-8.4	0-2	Low-----	0.28				
156*, 157*:													
Lithic													
Kaplustolls----													
Rock outcrop----													
158-----	0-4	40-50	1.20-1.30	0.06-0.2	0.16-0.18	7.4-8.4	<4	High-----	0.37	5	6	1-2	
Lohmiller	4-60	35-50	1.30-1.40	0.06-0.2	0.13-0.15	7.4-8.4	<4	High-----	0.43				
159*:													
Lohmiller, saline-----	0-6	35-40	1.15-1.25	0.06-0.2	0.18-0.20	7.9-8.4	2-4	High-----	0.32	5	4L	1-2	
	6-60	35-50	1.30-1.40	0.06-0.2	0.13-0.15	7.9-8.4	4-8	High-----	0.43				
Haverdad, saline	0-9	18-27	1.15-1.25	0.6-2.0	0.14-0.16	7.4-8.4	0-4	Low-----	0.32	5	5	1-2	
	9-60	24-35	1.20-1.30	0.6-2.0	0.08-0.10	7.9-9.0	4-8	Moderate	0.37				
160-----	0-4	27-40	1.20-1.30	0.06-0.2	0.18-0.20	7.4-7.8	0-2	Moderate	0.37	5	4L	.5-1	
Manzanola	4-15	35-40	1.20-1.30	0.06-0.2	0.18-0.20	7.9-8.4	0-2	High-----	0.43				
	15-60	30-40	1.20-1.30	0.06-0.2	0.18-0.20	7.9-9.0	0-2	Moderate	0.43				
161-----	0-4	20-27	1.20-1.30	0.6-2.0	0.18-0.20	7.4-8.4	0-2	Moderate	0.37	3	4L	.5-2	
Minnequa	4-24	28-35	1.20-1.30	0.2-0.6	0.18-0.20	7.9-8.4	0-2	Moderate	0.43				
	24	---	---	---	---	---	---	-----	-----				
162*:													
Minnequa-----	0-4	28-35	1.20-1.30	0.2-0.6	0.18-0.20	7.4-8.4	0-2	Moderate	0.37	3	4L	.5-2	
	4-24	28-35	1.20-1.30	0.2-0.6	0.18-0.20	7.9-8.4	0-2	Moderate	0.43				
	24	---	---	---	---	---	---	-----	-----				
Midway-----	0-4	27-40	1.20-1.30	0.2-0.6	0.19-0.21	7.4-7.8	0-2	Moderate	0.37	2	4L	.5-1	
	4-16	30-50	1.20-1.30	0.06-0.2	0.15-0.17	7.9-8.4	0-2	High-----	0.32				
	16	---	---	---	---	---	---	-----	-----				
163-----	0-8	14-20	1.25-1.35	0.6-6.0	0.12-0.14	6.6-7.8	0-2	Low-----	0.32	5	3	2-4	
Moskee	8-24	20-35	1.25-1.35	0.6-2.0	0.15-0.17	6.6-7.8	0-2	Moderate	0.32				
	24-60	12-18	1.35-1.45	2.0-6.0	0.12-0.14	7.9-8.4	0-4	Low-----	0.24				
164*:													
Moskee-----	0-10	14-20	1.25-1.35	0.6-6.0	0.12-0.14	6.6-7.8	0-2	Low-----	0.32	5	3	2-4	
	10-31	20-35	1.25-1.35	0.6-2.0	0.15-0.17	6.6-7.8	0-2	Moderate	0.32				
	31-60	12-18	1.35-1.45	2.0-6.0	0.12-0.14	7.9-8.4	0-4	Low-----	0.24				
Manter-----	0-8	7-13	1.25-1.35	2.0-6.0	0.12-0.15	6.6-7.8	0-0	Low-----	0.32	5	3	2-4	
	8-29	10-18	1.35-1.45	2.0-6.0	0.12-0.15	6.6-7.8	0-0	Low-----	0.37				
	29-60	6-14	1.50-1.60	2.0-6.0	0.12-0.15	7.9-8.4	0-0	Low-----	0.37				
165*:													
Moskee, dry-----	0-10	14-20	1.25-1.35	0.6-6.0	0.12-0.14	6.6-7.8	0-2	Low-----	0.32	5	3	2-4	
	10-27	20-35	1.25-1.35	0.6-2.0	0.15-0.17	6.6-7.8	0-2	Moderate	0.32				
	27-60	12-18	1.35-1.45	2.0-6.0	0.12-0.14	7.9-9.0	0-4	Low-----	0.24				

Table 12.-Physical and Chemical Properties of the Soils--Continued

(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	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors		Wind erodi- bility	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH	mmhos/cm		K	T	group	Pct	
165*:(cont.)													
Manter, dry-----	0-11	7-13	1.25-1.35	2.0-6.0	0.12-0.15	6.6-7.8	0-0	Low-----	0.32	5	3	2-4	
	11-34	10-18	1.35-1.45	2.0-6.0	0.12-0.15	6.6-7.8	0-0	Low-----	0.37				
	34-60	6-14	1.50-1.60	2.0-6.0	0.12-0.15	7.9-8.4	0-0	Low-----	0.37				
166-----	0-7	8-16	1.25-1.35	2.0-6.0	0.12-0.15	6.6-7.3	0-0	Low-----	0.28	5	3	2-3	
Noden	7-32	20-35	1.25-1.35	0.6-2.0	0.17-0.20	6.6-7.8	0-0	Moderate	0.37				
	32-60	8-18	1.35-1.45	2.0-6.0	0.12-0.15	6.6-7.8	0-0	Low-----	0.43				
167*:													
Orella-----	0-3	32-40	1.05-1.15	0.2-0.6	0.15-0.17	7.9-8.4	0-4	Moderate	0.49	2	7	1-2	
	3-14	35-50	1.15-1.25	0.06-0.2	0.12-0.14	>8.4	2-8	High-----	0.49				
	14	---	---	---	---	---	---	-----	---				
Cadoma-----	0-1	35-40	1.05-1.15	0.06-0.2	0.18-0.20	7.9-9.0	0-4	Moderate	0.37	3	7	1-2	
	1-11	35-50	1.20-1.30	0.06-0.2	0.12-0.15	8.5-9.6	4-8	High-----	0.43				
	11-34	35-50	1.20-1.30	0.06-0.2	0.10-0.12	7.9-9.6	4-8	High-----	0.43				
	34	---	---	---	---	---	---	-----	---				
Rock outcrop----													
168*:													
Orpha, moist----	0-3	2-8	1.35-1.45	6.0-20	0.07-0.09	6.6-7.3	0-0	Low-----	0.15	5	2	.5-1	
	3-38	2-8	1.35-1.50	6.0-20	0.06-0.09	6.6-7.3	0-0	Low-----	0.15				
	38-60	2-6	1.45-1.55	6.0-20	0.05-0.07	6.6-7.8	0-0	Low-----	0.17				
Dailey-----	0-14	0-5	1.50-1.60	6.0-20	0.07-0.10	6.1-7.3	0-0	Low-----	0.15	5	2	2-3	
	14-60	0-5	1.50-1.65	6.0-20	0.06-0.09	6.1-7.3	0-0	Low-----	0.15				
169*:													
Orpha-----	0-5	3-8	1.35-1.45	>20	0.05-0.07	6.6-7.8	0-0	Low-----	0.15	5	1	1-2	
	5-60	3-8	1.45-1.55	>20	0.05-0.08	6.6-7.8	0-0	Low-----	0.20				
Dwyer-----	0-5	1-5	1.35-1.45	>20	0.05-0.07	7.4-8.4	0-0	Low-----	0.28	5	1	1-2	
	5-60	1-8	1.45-1.55	>20	0.05-0.09	7.9-8.4	0-0	Low-----	0.32				
170*:													
Orpha-----	0-3	3-8	1.35-1.45	>20	0.05-0.07	6.6-7.8	0-0	Low-----	0.15	5	1	1-2	
	3-60	3-8	1.45-1.55	>20	0.05-0.08	6.6-7.8	0-0	Low-----	0.20				
Dwyer-----	0-6	1-5	1.35-1.45	>20	0.05-0.07	7.4-8.4	0-0	Low-----	0.28	5	1	1-2	
	6-60	1-8	1.45-1.55	>20	0.05-0.09	7.9-8.4	0-0	Low-----	0.32				
Taluca-----	0-4	8-18	1.25-1.35	6.0-20	0.12-0.15	7.4-8.4	0-0	Low-----	0.28	2	3	.5-1	
	4-16	10-18	1.35-1.45	6.0-20	0.12-0.14	7.9-9.0	0-0	Low-----	0.32				
	16	---	---	---	---	---	---	-----	---				
171:-----	0-60	20-40	1.15-1.30	0.06-2.0	0.14-0.21	7.4-8.4	0-2	---	--	5	---	---	
Oxyaquic Torrifluvents													
172-----	0-16	35-40	1.05-1.15	0.2-0.6	0.12-0.15	3.6-5.0	0-2	High-----	0.43	3	4	2-5	
Paiges	16-39	35-60	1.20-1.30	0.06-0.2	0.12-0.15	3.6-4.4	0-2	High-----	0.32				
	39	---	---	---	---	---	---	-----	---				

Table 12.-Physical and Chemical Properties of the Soils--Continued

(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	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH	mmhos/cm	K	T			Pct	
173*:													
Phiferon-----	0-11	6-10	1.35-1.45	2.0-6.0	0.10-0.12	6.6-7.8	0-0	Low-----	0.24	3	2	1-3	
	11-38	6-14	1.35-1.45	2.0-6.0	0.12-0.15	7.4-7.8	0-0	Low-----	0.32				
	38	---	---	---	---	---	---	-----	----				
Tassel-----	0-2	5-9	1.40-1.50	6.0-20	0.07-0.09	7.4-8.4	0-0	Low-----	0.17	2	2	1-2	
	2-12	5-10	1.35-1.50	2.0-6.0	0.06-0.10	7.4-8.4	0-2	Low-----	0.20				
	12	---	---	---	---	---	---	-----	----				
Rock outcrop----													
174*:													
Phiferon-----	0-6	8-16	1.30-1.40	2.0-6.0	0.12-0.15	6.6-7.8	0-0	Low-----	0.28	3	3	1-3	
	6-16	8-16	1.35-1.45	2.0-6.0	0.14-0.16	6.6-7.8	0-0	Low-----	0.24				
	16-26	6-16	1.35-1.45	2.0-6.0	0.13-0.15	7.9-8.4	0-0	Low-----	0.32				
	26	---	---	---	---	---	---	-----	----				
Trelona-----	0-7	6-15	1.25-1.35	2.0-6.0	0.13-0.15	6.6-7.8	0-0	Low-----	0.28	2	3	1-3	
	7-14	6-15	1.35-1.50	2.0-6.0	0.11-0.15	6.6-7.8	0-0	Low-----	0.37				
	14	---	---	---	---	---	---	-----	----				
175-----													
Pierre	0-3	40-60	1.10-1.20	0.00-0.06	0.14-0.16	7.4-8.4	0-2	Very high	0.37	3	4	1-2	
	3-32	40-60	1.15-1.25	0.00-0.06	0.14-0.16	7.9-8.4	0-2	Very high	0.37				
	32	---	---	---	---	---	---	-----	----				
176*:													
Pierre-----	0-4	40-60	1.10-1.20	0.00-0.06	0.14-0.16	7.4-8.4	0-2	Very high	0.37	3	4	1-2	
	4-34	40-60	1.15-1.25	0.00-0.06	0.14-0.16	7.9-8.4	0-2	Very high	0.37				
	34	---	---	---	---	---	---	-----	----				
Grummit-----	0-4	40-60	1.05-1.15	0.2-0.6	0.14-0.16	4.5-5.5	<2	High-----	0.37	2	4	1-2	
	4-11	40-60	1.05-1.15	0.06-0.2	0.14-0.16	3.6-5.5	<2	High-----	0.43				
	11	---	---	---	---	---	---	-----	----				
177-----													
Recluse, dry	0-4	15-25	1.20-1.30	0.6-2.0	0.15-0.17	6.6-7.8	0-0	Low-----	0.32	5	5	2-3	
	4-23	20-35	1.25-1.35	0.6-2.0	0.17-0.20	6.6-7.8	0-0	Moderate	0.37				
	23-60	15-22	1.30-1.40	0.6-2.0	0.12-0.16	7.9-8.4	0-0	Low-----	0.32				
178*:													
Recluse-----	0-11	15-25	1.20-1.30	0.6-2.0	0.15-0.17	6.6-7.8	0-0	Low-----	0.32	5	5	2-3	
	11-29	20-35	1.25-1.35	0.6-2.0	0.17-0.20	6.6-7.8	0-0	Moderate	0.37				
	29-60	15-22	1.30-1.40	0.6-2.0	0.12-0.16	7.9-8.4	0-0	Low-----	0.32				
Cedak-----	0-4	15-22	1.15-1.25	0.6-2.0	0.16-0.18	6.6-7.8	0-0	Low-----	0.32	3	5	2-4	
	4-15	18-35	1.25-1.40	0.6-2.0	0.17-0.20	6.6-7.8	0-0	Moderate	0.37				
	15-29	12-22	1.25-1.40	0.6-2.0	0.15-0.17	7.9-9.0	0-0	Low-----	0.43				
	29	---	---	---	---	---	---	-----	----				
179*:													
Recluse-----	0-13	15-25	1.20-1.30	0.6-2.0	0.15-0.17	6.6-7.8	0-0	Low-----	0.32	5	5	2-3	
	13-23	20-35	1.25-1.35	0.6-2.0	0.17-0.20	6.6-7.8	0-0	Moderate	0.37				
	23-60	15-22	1.30-1.40	0.6-2.0	0.12-0.16	7.9-8.4	0-0	Low-----	0.32				
Cedak-----	0-8	15-22	1.15-1.25	0.6-2.0	0.16-0.18	6.6-7.8	0-0	Low-----	0.32	3	5	2-4	
	8-19	18-35	1.25-1.40	0.6-2.0	0.17-0.20	6.6-7.8	0-0	Moderate	0.37				
	19-32	12-22	1.25-1.40	0.6-2.0	0.15-0.17	7.9-9.0	0-0	Low-----	0.43				
	32	---	---	---	---	---	---	-----	----				

Table 12.-Physical and Chemical Properties of the Soils--Continued

(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	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
	In	Pct		G/cc	In/hr	In/in	pH	mmhos/cm		K	T		Pct
180*:													
Rhoame-----	0-3	40-60	1.15-1.30	0.06-0.2	0.14-0.16	6.1-7.8	0-0	High-----	0.32	5	4		1-2
	3-10	40-60	1.15-1.30	0.06-0.2	0.14-0.16	6.1-7.8	0-0	High-----	0.37				
	10-60	40-60	1.15-1.30	0.06-0.2	0.14-0.16	6.1-7.3	0-0	High-----	0.37				
Bahl-----	0-3	40-50	1.05-1.15	0.06-0.2	0.14-0.16	7.4-8.4	0-2	High-----	0.32	5	4		1-2
	3-60	40-55	1.15-1.25	0.06-0.2	0.14-0.16	7.9-9.0	0-4	High-----	0.37				
181*:													
Rock outcrop													
182*:													
Rock outcrop----													
Tassel-----	0-3	5-9	1.40-1.50	6.0-20	0.07-0.09	7.4-8.4	0-0	Low-----	0.17	2	2		1-2
	3-11	5-10	1.35-1.50	2.0-6.0	0.06-0.09	7.4-8.4	0-2	Low-----	0.20				
	11	---	---	---	---	---	---	-----	---				
183-----													
Samday	0-3	40-50	1.15-1.30	0.06-0.2	0.14-0.16	7.4-8.4	0-0	High-----	0.32	2	4		1-2
	3-13	35-50	1.15-1.30	0.06-0.2	0.15-0.19	7.4-9.0	0-4	High-----	0.37				
	13	---	---	---	---	---	---	-----	---				
184*:													
Samday-----	0-3	40-50	1.15-1.30	0.06-0.2	0.14-0.16	7.4-8.4	0-0	High-----	0.32	2	4		1-2
	3-18	35-50	1.15-1.30	0.06-0.2	0.15-0.19	7.4-9.0	0-4	High-----	0.37				
	18	---	---	---	---	---	---	-----	---				
Pierre-----	0-4	40-60	1.10-1.20	0.00-0.06	0.14-0.16	7.4-8.4	0-2	Very high	0.37	3	4		1-2
	4-32	40-60	1.15-1.25	0.00-0.06	0.14-0.16	7.9-8.4	0-2	Very high	0.37				
	32	---	---	---	---	---	---	-----	---				
185*:													
Samday-----	0-3	40-50	1.15-1.30	0.06-0.2	0.14-0.16	7.4-8.4	0-0	High-----	0.32	2	4		1-2
	3-13	35-50	1.15-1.30	0.06-0.2	0.15-0.19	7.4-9.0	0-4	High-----	0.37				
	13	---	---	---	---	---	---	-----	---				
Savageton-----	0-5	35-40	1.20-1.30	0.06-0.2	0.17-0.19	6.6-8.4	0-0	High-----	0.32	3	6		1-3
	5-11	40-60	1.25-1.35	0.06-0.2	0.14-0.16	7.4-9.0	2-4	High-----	0.37				
	11-24	40-60	1.25-1.35	0.06-0.2	0.14-0.16	7.4-9.0	2-4	High-----	0.37				
	24	---	---	---	---	---	---	-----	---				
Bahl-----	0-6	35-40	1.15-1.25	0.06-0.2	0.18-0.20	7.4-8.4	0-2	High-----	0.32	5	6		1-2
	6-12	35-50	1.20-1.30	0.06-0.2	0.14-0.18	7.9-9.0	0-4	High-----	0.37				
	12-60	40-55	1.15-1.25	0.06-0.2	0.14-0.16	7.9-9.0	0-4	High-----	0.37				
186*:													
Savageton-----	0-5	35-40	1.20-1.30	0.06-0.2	0.17-0.19	6.6-8.4	0-0	High-----	0.32	3	6		1-3
	5-11	40-60	1.25-1.35	0.06-0.2	0.14-0.16	7.4-9.0	2-4	High-----	0.37				
	11-24	40-60	1.25-1.35	0.06-0.2	0.14-0.16	7.4-9.0	2-4	High-----	0.37				
	24	---	---	---	---	---	---	-----	---				
Bahl-----	0-1	35-40	1.15-1.25	0.06-0.2	0.18-0.20	7.4-8.4	0-2	High-----	0.32	5	6		1-2
	1-14	35-50	1.20-1.30	0.06-0.2	0.14-0.18	7.9-9.0	0-4	High-----	0.37				
	14-60	40-55	1.15-1.25	0.06-0.2	0.14-0.16	7.9-9.0	0-4	High-----	0.37				
187*:													
Schamber-----	0-2	4-8	1.35-1.45	6.0-20	0.04-0.06	7.4-7.8	0-0	Low-----	0.10	5	8		1-3
	2-60	2-8	1.45-1.55	6.0-20	0.03-0.04	7.4-8.4	0-0	Low-----	0.05				

Table 12.-Physical and Chemical Properties of the Soils--Continued

(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	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
									K	T		
	In	Pct	G/cc	In/hr	In/in	pH	mmhos/cm					Pct
187*:(cont.)												
Tullock-----	0-3	4-10	1.40-1.50	6.0-20	0.07-0.09	7.4-8.4	0-0	Low-----	0.17	3	2	1-2
	3-24	4-12	1.45-1.55	6.0-20	0.07-0.09	7.9-9.0	0-0	Low-----	0.17			
	24	---	---	---	---	---	---	-----	---			
188-----	0-2	18-27	1.15-1.25	0.6-2.0	0.16-0.20	6.6-7.8	0-2	Low-----	0.55	5	6	.5-1
Senlar	2-16	18-35	1.15-1.25	0.6-2.0	0.18-0.22	7.4-9.0	0-2	Moderate	0.43			
	16-28	18-27	1.25-1.35	0.6-2.0	0.16-0.20	7.9-9.0	0-4	Low-----	0.55			
	28-60	15-27	1.25-1.35	0.6-2.0	0.16-0.20	7.9-9.0	0-4	Low-----	0.55			
189*:												
Shingle-----	0-6	18-27	1.15-1.25	0.6-2.0	0.16-0.18	7.4-8.4	0-0	Low-----	0.32	2	5	1-3
	6-17	20-35	1.25-1.40	0.6-2.0	0.16-0.20	7.9-9.0	0-0	Moderate	0.37			
	17	---	---	---	---	---	---	-----	---			
Rock outcrop----												
Samday-----	0-3	40-50	1.15-1.30	0.06-0.2	0.14-0.16	7.4-8.4	0-0	High-----	0.32	2	4	1-2
	3-14	35-50	1.15-1.30	0.06-0.2	0.15-0.19	7.4-9.0	0-4	High-----	0.37			
	14	---	---	---	---	---	---	-----	---			
190-----	0-2	20-27	1.05-1.15	0.2-0.6	0.18-0.20	7.4-8.4	0-2	Low-----	0.43	5	6	1-3
Silhouette	2-15	35-40	1.20-1.30	0.2-0.6	0.18-0.20	7.9-8.4	0-4	Moderate	0.43			
	15-60	35-50	1.20-1.40	0.06-0.2	0.12-0.16	7.9-9.0	2-4	High-----	0.49			
191*:												
Skilak-----	0-3	40-44	1.05-1.15	0.2-0.6	0.16-0.18	7.4-8.4	0-2	High-----	0.37	5	4	1-2
	3-7	18-35	1.15-1.25	0.6-2.0	0.18-0.22	7.9-9.0	2-4	Moderate	0.43			
	7-60	18-35	1.15-1.25	0.6-2.0	0.15-0.18	7.9-9.0	2-4	Moderate	0.32			
Kishona-----	0-4	28-34	1.20-1.30	0.6-2.0	0.17-0.19	7.4-8.4	0-2	Moderate	0.37	5	4	1-2
	4-60	20-35	1.25-1.35	0.6-2.0	0.16-0.19	7.9-9.0	0-4	Moderate	0.37			
192*:												
Sunup-----	0-2	15-20	1.25-1.35	2.0-6.0	0.06-0.08	6.6-7.8	0-0	Low-----	0.10	1	8	1-2
	2-10	20-28	1.25-1.35	0.6-2.0	0.05-0.07	6.6-7.8	0-0	Moderate	0.10			
	10	---	---	---	---	---	---	-----	---			
Rock outcrop----												
193*:												
Taluca, cool----	0-4	9-18	1.25-1.35	2.0-6.0	0.11-0.14	7.4-8.4	0-0	Low-----	0.24	2	3	.5-1
	4-16	10-18	1.35-1.45	2.0-6.0	0.10-0.12	7.9-9.0	0-2	Low-----	0.24			
	16	---	---	---	---	---	---	-----	---			
Keeline-----	0-4	8-18	1.25-1.35	2.0-6.0	0.14-0.16	6.6-8.4	0-2	Low-----	0.24	5	3	1-2
	4-60	6-18	1.35-1.45	2.0-6.0	0.13-0.16	7.9-9.0	0-4	Low-----	0.28			
194*:												
Taluca-----	0-5	8-18	1.25-1.35	6.0-20	0.12-0.15	7.4-8.4	0-0	Low-----	0.28	2	3	.5-1
	5-16	10-18	1.35-1.45	6.0-20	0.12-0.14	7.9-9.0	0-0	Low-----	0.32			
	16	---	---	---	---	---	---	-----	---			
Rock outcrop----												
Shingle-----	0-6	18-27	1.15-1.25	0.6-2.0	0.16-0.18	7.4-8.4	0-0	Low-----	0.32	2	5	1-3
	6-17	20-35	1.25-1.40	0.6-2.0	0.16-0.20	7.9-9.0	0-0	Moderate	0.37			
	17	---	---	---	---	---	---	-----	---			

Table 12.-Physical and Chemical Properties of the Soils--Continued

(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 	Moist bulk density	Permea- bility	Available water capacity	Soil reaction pH	Salinity mmhos/cm	Shrink- swell potential	Erosion factors		Wind erodi- bility group	Organic matter Pct
	In	Pct								K	T		
195*:													
Taluce-----	0-4	8-18	1.25-1.35	6.0-20	0.12-0.15	7.4-8.4	0-0	Low-----	0.28	2	3	.5-1	
	4-17	10-18	1.35-1.45	6.0-20	0.12-0.14	7.9-9.0	0-0	Low-----	0.32				
	17	---	---	---	---	---	---	-----	-----				
Rock outcrop----													
Turnercrest-----	0-4	7-16	1.30-1.40	2.0-6.0	0.12-0.14	7.4-8.4	0-0	Low-----	0.32	3	3	1-2	
	4-35	7-18	1.40-1.50	2.0-6.0	0.11-0.13	7.4-8.4	0-0	Low-----	0.32				
	35	---	---	---	---	---	---	-----	-----				
196*:													
Taluce-----	0-5	8-18	1.25-1.35	6.0-20	0.12-0.15	7.4-8.4	0-0	Low-----	0.28	2	3	.5-1	
	5-16	10-18	1.35-1.45	6.0-20	0.12-0.14	7.9-9.0	0-0	Low-----	0.32				
	16	---	---	---	---	---	---	-----	-----				
Shingle-----	0-6	18-27	1.15-1.25	0.6-2.0	0.16-0.18	7.4-8.4	0-0	Low-----	0.32	2	5	1-3	
	6-17	20-35	1.25-1.40	0.6-2.0	0.16-0.20	7.9-9.0	0-0	Moderate	0.37				
	17	---	---	---	---	---	---	-----	-----				
197*:													
Taluce-----	0-4	8-18	1.25-1.35	6.0-20	0.12-0.15	7.4-8.4	0-0	Low-----	0.28	2	3	.5-1	
	4-16	10-18	1.35-1.45	6.0-20	0.12-0.14	7.9-9.0	0-0	Low-----	0.32				
	16	---	---	---	---	---	---	-----	-----				
Tullock-----	0-4	4-10	1.40-1.50	6.0-20	0.07-0.09	7.4-8.4	0-0	Low-----	0.17	3	2	1-2	
	4-30	4-12	1.45-1.55	6.0-20	0.07-0.09	7.9-9.0	0-0	Low-----	0.17				
	30	---	---	---	---	---	---	-----	-----				
Rock outcrop----													
198*:													
Taluce-----	0-5	8-18	1.25-1.35	6.0-20	0.12-0.15	7.4-8.4	0-0	Low-----	0.28	2	3	.5-1	
	5-17	10-18	1.35-1.45	6.0-20	0.12-0.14	7.9-9.0	0-0	Low-----	0.32				
	17	---	---	---	---	---	---	-----	-----				
Turnercrest-----	0-4	7-16	1.30-1.40	2.0-6.0	0.12-0.14	7.4-8.4	0-0	Low-----	0.32	3	3	1-2	
	4-35	7-18	1.40-1.50	2.0-6.0	0.11-0.13	7.4-8.4	0-0	Low-----	0.32				
	35	---	---	---	---	---	---	-----	-----				
Keeline-----	0-3	8-18	1.25-1.35	2.0-6.0	0.14-0.16	6.6-8.4	0-2	Low-----	0.24	5	3	1-2	
	3-60	6-18	1.35-1.45	2.0-6.0	0.13-0.16	7.9-9.0	0-4	Low-----	0.28				
199*:													
Tassel-----	0-3	5-9	1.40-1.50	6.0-20	0.07-0.09	7.4-8.4	0-0	Low-----	0.17	2	2	1-2	
	3-11	5-10	1.35-1.50	2.0-6.0	0.06-0.09	7.4-8.4	0-2	Low-----	0.20				
	11	---	---	---	---	---	---	-----	-----				
Ponderosa-----	0-13	5-12	1.35-1.55	2.0-6.0	0.11-0.13	6.6-7.3	<2	Low-----	0.20	5	2	1-3	
	13-22	5-18	1.55-1.80	2.0-6.0	0.10-0.16	6.6-7.8	<2	Low-----	0.43				
	22-60	5-18	1.55-1.80	2.0-6.0	0.10-0.16	7.4-8.4	<2	Low-----	0.43				
Rock outcrop----													
200*:													
Tassel-----	0-2	5-10	1.35-1.45	2.0-6.0	0.12-0.14	7.4-8.4	0-0	Low-----	0.28	2	3	1-2	
	2-14	5-10	1.35-1.50	2.0-6.0	0.06-0.10	7.4-8.4	0-2	Low-----	0.20				
	14	---	---	---	---	---	---	-----	-----				

Table 12.-Physical and Chemical Properties of the Soils--Continued

(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	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
									K	T		
	In	Pct	G/cc	In/hr	In/in	pH	mmhos/cm					Pct
200*:(cont.)												
Trelona-----	0-7	6-15	1.25-1.35	2.0-6.0	0.13-0.15	6.6-7.8	0-0	Low-----	0.28	2	3	1-3
	7-17	6-15	1.35-1.50	2.0-6.0	0.11-0.15	6.6-7.8	0-0	Low-----	0.37			
	17	---	---	---	---	---	---	-----	----			
Phiferson-----	0-7	8-16	1.30-1.40	2.0-6.0	0.12-0.15	6.6-7.8	0-0	Low-----	0.28	3	3	1-3
	7-21	8-16	1.35-1.45	2.0-6.0	0.14-0.16	6.6-7.8	0-0	Low-----	0.24			
	21-34	6-16	1.35-1.45	2.0-6.0	0.13-0.15	7.9-8.4	0-0	Low-----	0.32			
	34	---	---	---	---	---	---	-----	----			
201*:												
Terro-----	0-8	5-12	1.25-1.35	2.0-6.0	0.13-0.15	6.6-7.8	0-0	Low-----	0.28	3	3	1-3
	8-24	10-18	1.35-1.45	2.0-6.0	0.13-0.16	6.6-7.8	0-0	Low-----	0.28			
	24-36	8-15	1.40-1.50	2.0-6.0	0.10-0.15	7.4-9.0	0-0	Low-----	0.32			
	36	---	---	---	---	---	---	-----	----			
Turnercrest-----	0-6	8-16	1.30-1.40	2.0-6.0	0.10-0.12	7.4-8.4	0-0	Low-----	0.24	3	3	1-2
	6-25	7-18	1.40-1.50	2.0-6.0	0.11-0.13	7.4-8.4	0-0	Low-----	0.32			
	25	---	---	---	---	---	---	-----	----			
202*:												
Terro-----	0-3	5-12	1.25-1.35	2.0-6.0	0.13-0.15	6.6-7.8	0-0	Low-----	0.28	3	3	1-3
	3-22	10-18	1.35-1.45	2.0-6.0	0.13-0.16	6.6-7.8	0-0	Low-----	0.28			
	22-36	8-15	1.40-1.50	2.0-6.0	0.10-0.15	7.4-9.0	0-0	Low-----	0.32			
	36	---	---	---	---	---	---	-----	----			
Vonalee-----	0-3	5-12	1.25-1.35	2.0-6.0	0.10-0.15	6.6-7.8	0-0	Low-----	0.24	5	3	1-3
	3-11	8-18	1.35-1.45	2.0-6.0	0.12-0.16	6.6-7.8	0-0	Low-----	0.28			
	11-24	8-15	1.35-1.45	2.0-6.0	0.12-0.16	7.9-9.0	0-0	Low-----	0.32			
	24-60	8-15	1.35-1.45	2.0-6.0	0.12-0.16	7.9-9.0	0-0	Low-----	0.32			
203*:												
Terro-----	0-5	5-12	1.25-1.35	2.0-6.0	0.13-0.15	6.6-7.8	0-0	Low-----	0.28	3	3	1-3
	5-30	10-18	1.35-1.45	2.0-6.0	0.13-0.16	6.6-7.8	0-0	Low-----	0.28			
	30-38	8-15	1.40-1.50	2.0-6.0	0.10-0.15	7.4-9.0	0-0	Low-----	0.32			
	38	---	---	---	---	---	---	-----	----			
Vonalee-----	0-2	5-12	1.25-1.35	2.0-6.0	0.10-0.15	6.6-7.8	0-0	Low-----	0.24	5	3	1-3
	2-17	8-18	1.35-1.45	2.0-6.0	0.12-0.16	6.6-7.8	0-0	Low-----	0.28			
	17-60	8-15	1.35-1.45	2.0-6.0	0.12-0.16	7.9-9.0	0-0	Low-----	0.32			
Taluce-----	0-5	8-18	1.25-1.35	6.0-20	0.12-0.15	7.4-8.4	0-0	Low-----	0.28	2	3	5-1
	5-18	10-18	1.35-1.45	6.0-20	0.12-0.14	7.9-9.0	0-0	Low-----	0.32			
	18	---	---	---	---	---	---	-----	----			
204*, 205*:												
Theedle-----	0-8	18-27	1.15-1.25	0.6-2.0	0.16-0.18	6.6-8.4	0-0	Low-----	0.32	3	4L	1-2
	8-28	20-35	1.25-1.35	0.6-2.0	0.16-0.20	7.4-9.0	0-4	Moderate	0.37			
	28	---	---	---	---	---	---	-----	----			
Kishona-----	0-7	15-25	1.15-1.25	0.6-2.0	0.14-0.17	7.4-8.4	0-2	Low-----	0.28	5	5	1-2
	7-60	20-35	1.25-1.35	0.6-2.0	0.16-0.19	7.9-9.0	0-4	Moderate	0.37			
206*:												
Theedle-----	0-6	18-27	1.15-1.25	0.6-2.0	0.16-0.18	6.6-8.4	0-0	Low-----	0.32	3	4L	1-2
	6-32	20-35	1.25-1.35	0.6-2.0	0.16-0.20	7.4-9.0	0-4	Moderate	0.37			
	32	---	---	---	---	---	---	-----	----			

Table 12.-Physical and Chemical Properties of the Soils--Continued

(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 	Moist bulk density	Permea- bility	Available water capacity	Soil reaction pH	Salinity mmhos/cm	Shrink- swell potential	Erosion factors		Wind erodi- bility group	Organic matter Pct
	In	Pct								G/cc	In/hr		
206*:(cont.)													
Kishona-----	0-4	15-25	1.15-1.25	0.6-2.0	0.14-0.17	7.4-8.4	0-2	Low-----	0.28	5	5	1-2	
	4-60	20-35	1.25-1.35	0.6-2.0	0.16-0.19	7.9-9.0	0-4	Moderate	0.37				
Shingle-----	0-4	18-27	1.15-1.25	0.6-2.0	0.16-0.18	7.4-8.4	0-0	Low-----	0.32	2	5	1-3	
	4-12	20-35	1.25-1.40	0.6-2.0	0.16-0.20	7.9-9.0	0-0	Moderate	0.37				
	12	---	---	---	---	---	---	-----	----				
207-----	0-8	15-24	1.05-1.15	0.6-2.0	0.19-0.22	6.6-7.8	0-0	Low-----	0.55	5	6	2-4	
Thirtynine	8-24	18-35	1.15-1.25	0.6-2.0	0.19-0.22	7.4-8.4	0-0	Moderate	0.49				
	24-38	15-30	1.15-1.25	0.6-2.0	0.19-0.22	7.9-9.0	0-0	Moderate	0.49				
	38-60	6-18	1.15-1.25	0.6-2.0	0.16-0.20	7.9-9.0	0-2	Low-----	0.55				
208*:													
Thirtynine-----	0-11	15-24	1.05-1.15	0.6-2.0	0.19-0.22	6.6-7.8	0-0	Low-----	0.55	5	6	2-4	
	11-24	18-35	1.15-1.25	0.6-2.0	0.19-0.22	7.4-8.4	0-0	Moderate	0.49				
	24-39	15-30	1.15-1.25	0.6-2.0	0.19-0.22	7.9-9.0	0-0	Moderate	0.49				
	39-60	6-18	1.15-1.25	0.6-2.0	0.16-0.20	7.9-9.0	0-2	Low-----	0.55				
Kadoka-----	0-7	18-25	1.05-1.15	0.6-2.0	0.16-0.20	6.6-7.8	<2	Low-----	0.49	3	6	2-3	
	7-14	20-35	1.15-1.25	0.6-2.0	0.18-0.20	7.4-8.4	<2	Moderate	0.43				
	14-32	14-24	1.15-1.25	0.6-2.0	0.16-0.18	7.9-9.0	<4	Low-----	0.49				
	32	---	---	---	---	---	---	-----	----				
209*:													
Threetop-----	0-3	18-25	1.15-1.25	0.6-2.0	0.16-0.18	6.1-7.3	0-0	Low-----	0.32	2	5	1-2	
	3-11	25-35	1.25-1.35	0.6-2.0	0.15-0.19	6.6-7.8	0-0	Moderate	0.37				
	11-28	12-22	1.30-1.40	2.0-6.0	0.12-0.16	7.9-9.0	0-0	Low-----	0.32				
	28	---	---	---	---	---	---	-----	----				
Sunup-----	0-2	15-25	1.15-1.25	0.6-2.0	0.11-0.13	6.6-7.8	0-0	Low-----	0.20	1	8	1-3	
	2-10	18-28	1.25-1.40	2.0-6.0	0.07-0.10	7.9-9.0	0-0	Low-----	0.10				
	10	---	---	---	---	---	---	-----	----				
210*:													
Torrington-----	0-5	5-15	1.25-1.35	2.0-6.0	0.15-0.17	6.6-7.3	0-0	Low-----	0.32	3	3	1-3	
	5-19	10-18	1.25-1.35	2.0-6.0	0.15-0.17	6.6-7.8	0-0	Low-----	0.32				
	19-29	5-10	1.45-1.55	6.0-20	0.09-0.11	7.4-7.8	0-0	Low-----	0.32				
	29	---	---	---	---	---	---	-----	----				
Julesburg-----	0-12	8-14	1.35-1.45	2.0-6.0	0.14-0.16	6.6-7.3	0-0	Low-----	0.24	5	3	1-3	
	12-38	12-18	1.30-1.40	2.0-6.0	0.12-0.15	6.6-7.8	0-0	Low-----	0.20				
	38-60	6-14	1.40-1.50	2.0-6.0	0.09-0.13	6.6-7.8	0-0	Low-----	0.20				
211.													
Torriorthents													
212*:													
Trelona-----	0-7	6-15	1.25-1.35	2.0-6.0	0.13-0.15	6.6-7.8	0-0	Low-----	0.28	2	3	1-3	
	7-14	6-15	1.35-1.50	2.0-6.0	0.11-0.15	6.6-7.8	0-0	Low-----	0.37				
	14	---	---	---	---	---	---	-----	----				
Phiferson-----	0-5	8-16	1.30-1.40	2.0-6.0	0.12-0.15	6.6-7.8	0-0	Low-----	0.28	3	3	1-3	
	5-20	8-16	1.35-1.45	2.0-6.0	0.14-0.16	6.6-7.8	0-0	Low-----	0.24				
	20-31	6-14	1.35-1.45	2.0-6.0	0.12-0.15	7.9-8.4	0-0	Low-----	0.32				
	31	---	---	---	---	---	---	-----	----				

Table 12.-Physical and Chemical Properties of the Soils--Continued

(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	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors		Wind erodi- bility	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH	mmhos/cm	K	T	group	Pct		
212* (cont.)													
Vetal-----	0-24	12-18	1.25-1.35	2.0-6.0	0.12-0.14	6.1-7.8	<2	Low-----	0.28	5	3	2-4	
	24-60	12-18	1.30-1.40	2.0-6.0	0.12-0.16	6.6-7.8	<2	Low-----	0.28				
213-----	0-3	28-35	1.15-1.25	0.2-2.0	0.18-0.20	6.6-7.8	0-0	Moderate	0.32	5	6	1-2	
Ulm	3-15	35-50	1.20-1.30	0.2-0.6	0.16-0.18	6.6-7.8	0-0	High-----	0.37				
	15-60	35-50	1.20-1.30	0.2-0.6	0.14-0.16	7.9-9.0	0-0	High-----	0.37				
214*:													
Ulm-----	0-5	20-25	1.15-1.25	0.6-2.0	0.18-0.20	6.6-7.8	0-0	Moderate	0.32	5	6	1-2	
	5-24	35-50	1.20-1.30	0.2-0.6	0.16-0.18	6.6-7.8	0-0	High-----	0.37				
	24-60	35-50	1.20-1.30	0.2-0.6	0.14-0.16	7.9-9.0	0-0	High-----	0.37				
Bidman-----	0-3	15-27	1.15-1.25	0.6-2.0	0.17-0.19	6.6-7.8	0-0	Moderate	0.32	5	6	1-2	
	3-16	35-50	1.20-1.30	0.06-0.2	0.14-0.16	6.6-7.8	0-0	High-----	0.37				
	16-60	25-35	1.25-1.35	0.2-0.6	0.19-0.21	7.9-9.0	0-2	High-----	0.43				
215*:													
Ulm-----	0-5	20-25	1.15-1.25	0.6-2.0	0.18-0.20	6.6-7.8	0-0	Moderate	0.32	5	6	1-2	
	5-24	35-50	1.20-1.30	0.2-0.6	0.16-0.18	6.6-7.8	0-0	High-----	0.37				
	24-60	35-50	1.20-1.30	0.2-0.6	0.14-0.16	7.9-9.0	0-0	High-----	0.37				
Forkwood-----	0-3	14-22	1.15-1.25	0.6-2.0	0.15-0.17	6.6-7.8	0-0	Low-----	0.32	5	5	1-2	
	3-18	25-35	1.25-1.35	0.6-2.0	0.17-0.20	6.6-7.8	0-0	Moderate	0.37				
	18-23	28-35	1.25-1.35	0.6-2.0	0.17-0.20	7.4-8.4	0-0	Moderate	0.37				
	23-60	20-30	1.25-1.35	0.6-2.0	0.13-0.16	7.9-9.0	0-2	Low-----	0.32				
216:-----													
Ustic Torriorthents													
217*:													
Ustic Torriorthents, cool-----													
Torriorthentic Haplustolls----													
Rock outcrop----													
218-----	0-24	12-18	1.25-1.35	2.0-6.0	0.12-0.14	6.1-7.8	<2	Low-----	0.28	5	3	2-4	
Vetal	24-60	12-18	1.30-1.40	2.0-6.0	0.12-0.16	6.6-7.8	<2	Low-----	0.28				
219-----	0-30	12-18	1.25-1.35	2.0-6.0	0.12-0.14	6.1-7.8	<2	Low-----	0.28	5	3	2-4	
Vetal	30-60	12-18	1.30-1.40	2.0-6.0	0.12-0.16	6.6-7.8	<2	Low-----	0.28				
220*:													
Vetal-----	0-32	12-18	1.25-1.35	2.0-6.0	0.12-0.14	6.1-7.8	<2	Low-----	0.28	5	3	2-4	
	32-60	12-18	1.30-1.40	2.0-6.0	0.12-0.16	6.6-7.8	<2	Low-----	0.28				
Phiferon-----	0-6	8-16	1.30-1.40	2.0-6.0	0.12-0.15	6.6-7.8	0-0	Low-----	0.28	3	3	1-3	
	6-25	8-16	1.35-1.45	2.0-6.0	0.14-0.16	6.6-7.8	0-0	Low-----	0.24				
	25-33	6-14	1.35-1.45	2.0-6.0	0.12-0.15	7.9-8.4	0-0	Low-----	0.32				
	33	---	---	---	---	---	---	-----	---				

Table 12.--Physical and Chemical Properties of the Soils--Continued

(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 	Moist bulk density	Permea- bility In/hr	Available water capacity	Soil reaction pH	Salinity mmhos/cm	Shrink- swell potential	Erosion factors		Wind erodi- bility group	Organic matter Pct
	In	Pct								G/cc	In/in		
221*:													
Vetal-----	0-24	12-18	1.25-1.35	2.0-6.0	0.12-0.14	6.1-7.8	<2	Low-----	0.28	5	3	2-4	
	24-60	12-18	1.30-1.40	2.0-6.0	0.12-0.16	6.6-7.8	<2	Low-----	0.28				
Phiferson-----	0-8	8-16	1.30-1.40	2.0-6.0	0.12-0.15	6.6-7.8	0-0	Low-----	0.28	3	3	1-3	
	8-23	8-16	1.35-1.45	2.0-6.0	0.14-0.16	6.6-7.8	0-0	Low-----	0.24				
	23-30	6-16	1.35-1.45	2.0-6.0	0.13-0.15	7.9-8.4	0-0	Low-----	0.32				
	30	---	---	---	---	---	---	-----	----				
222-----	0-3	5-12	1.25-1.35	2.0-6.0	0.10-0.15	6.6-7.8	0-0	Low-----	0.24	5	3	1-3	
Vonalee	3-32	8-18	1.35-1.45	2.0-6.0	0.12-0.16	6.6-7.8	0-0	Low-----	0.28				
	32-60	8-15	1.35-1.45	2.0-6.0	0.12-0.16	7.9-9.0	0-0	Low-----	0.32				
223*:													
Vonalee-----	0-4	5-12	1.25-1.35	2.0-6.0	0.10-0.15	6.6-7.8	0-0	Low-----	0.24	5	3	1-3	
	4-17	8-18	1.35-1.45	2.0-6.0	0.12-0.16	6.6-7.8	0-0	Low-----	0.28				
	17-60	8-15	1.35-1.45	2.0-6.0	0.12-0.16	7.9-9.0	0-0	Low-----	0.32				
Keeline-----	0-2	8-18	1.25-1.35	2.0-6.0	0.14-0.16	6.6-8.4	0-2	Low-----	0.24	5	3	1-2	
	2-60	6-18	1.35-1.45	2.0-6.0	0.13-0.16	7.9-9.0	0-4	Low-----	0.28				

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 13.-Soil and Water Features

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" 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	Hydro-logic group	Flooding			High water table			Bedrock		Risk of corrosion		
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Potential frost action	Uncoated steel	Concrete
					Ft			In				
100*: Absted-----	C	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	High.
Arvada-----	D	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
101*: Absted-----	C	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	High.
Cambria-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
102*: Albinas-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
Recluse-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
103*: Alice-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
Manter-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
104*: Alice-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
Phiferson-----	B	None-----	---	---	>6.0	---	---	20-40	Soft	Moderate	High-----	Low.
105*: Badland												
106----- Bahl	C	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
107*: Bahl-----	C	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Petrie-----	C	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	High.
108----- Bayard	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
109*: Bidman-----	C	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Slickspots-----												
110*: Brownrigg-----	D	None-----	---	---	>6.0	---	---	10-20	Soft	Moderate	Moderate	Low.
Featherlegs-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Wolf-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
111*: Bumbob-----	C	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	High.
Rhoame-----	C	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
112*: Busher-----	B	None-----	---	---	>6.0	---	---	40-60	Soft	Moderate	Low-----	Low.
Phiferson-----	B	None-----	---	---	>6.0	---	---	20-40	Soft	Moderate	High-----	Low.
113----- Cadoma	C	None-----	---	---	>6.0	---	---	20-40	Soft	Low-----	High-----	High.
114*: Cedak-----	B	None-----	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate	Low.
Trelona-----	C	None-----	---	---	>6.0	---	---	10-20	Soft	Low-----	Moderate	Low.

Table 13.-Soil and Water Features--Continued

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" 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	Hydro-logic group	Flooding			High water table			Bedrock		Risk of corrosion		
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Potential frost action	Uncoated steel	Concrete
115----- Clarkelen, overflow	B	Rare-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
116*: Clarkelen-----	B	Rare-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Draknab-----	A	Rare-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Dwyer-----	A	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
117----- Coalliams	B	Rare-----	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
118*: Cushman-----	C	None-----	---	---	>6.0	---	---	20-40	Soft	Low-----	High-----	Low.
Forkwood-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
119*: Dailey-----	A	None-----	---	---	>6.0	---	---	>60	---	Low-----	Moderate	Low.
Orpha, moist----	A	None-----	---	---	>6.0	---	---	>60	---	Low-----	Moderate	Low.
120----- Draknab	A	Rare-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
121*: Endoaquolls-----		Occasional--	Brief-----	Mar-Aug	1.0-3.0	Mar-Jun	---	>60	---	---	---	---
Torrifluvents----		Occasional--	Brief-----	Mar-Aug	2.0-4.0	Mar-Jun	---	>60	---	---	---	---
122*: Epping-----	D	None-----	---	---	>6.0	---	---	10-20	Soft	Low-----	High-----	Low.
Badland-----												
123*, 124*: Featherlegs-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Wolf-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
125*: Featherlegs-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Wolf-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
Brownrigg-----	D	None-----	---	---	>6.0	---	---	10-20	Soft	Moderate	Moderate	Low.
126*: Forkwood-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Cambria-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
127*: Forkwood-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Cambria-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Cushman-----	C	None-----	---	---	>6.0	---	---	20-40	Soft	Low-----	High-----	Low.
128*: Forkwood-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Cushman-----	C	None-----	---	---	>6.0	---	---	20-40	Soft	Low-----	High-----	Low.
Terro-----	C	None-----	---	---	>6.0	---	---	20-40	Soft	Low-----	High-----	Low.

Table 13.-Soil and Water Features--Continued

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" 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	Hydro-logic group	Flooding			High water table			Bedrock		Risk of corrosion		
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Potential frost action	Uncoated steel	Concrete
129*: Grummit, cool	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	High.
Rock outcrop												
130*: Grummit	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	High.
Rock outcrop												
131*: Grummit	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	High.
Hilight	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Low.
132*: Grummit	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	High.
Hilight	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Low.
Rock outcrop												
133*: Hargreave	B	None	---	---	>6.0	---	---	20-40	Soft	Low	High	Low.
Cedak	B	None	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate	Low.
134*: Hargreave	B	None	---	---	>6.0	---	---	20-40	Soft	Low	High	Low.
Lambman	C	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High	Low.
135*: Hargreave	B	None	---	---	>6.0	---	---	20-40	Soft	Low	High	Low.
Noden	B	None	---	---	>6.0	---	---	>60	---	Low	Moderate	Low.
136: Haverdad, overflow	B	Rare	---	---	>6.0	---	---	>60	---	Low	High	Low.
137*: Haverdad	B	Rare	---	---	>6.0	---	---	>60	---	Low	High	Low.
Clarkelen	B	Rare	---	---	>6.0	---	---	>60	---	Low	High	Low.
138*: Haverdad, saline	B	Rare	---	---	>6.0	---	---	>60	---	Low	High	High.
Clarkelen, saline	B	Rare	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
139: Hiland	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
140*, 141*: Hiland	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
Bowbac	C	None	---	---	>6.0	---	---	20-40	Soft	Low	High	Low.
142*: Hilight	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Low.
Rock outcrop												
143*: Hilight	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Low.
Savageton	C	None	---	---	>6.0	---	---	20-40	Soft	Low	High	Low.

Table 13.--Soil and Water Features--Continued

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" 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	Hydro-logic group	Flooding			High water table			Bedrock		Risk of corrosion		
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Potential frost action	Uncoated steel	Concrete
				Ft					In			
144*, 145*: Jayem-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Julesburg-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
146*: Jayem-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Phiferson-----	B	None-----	---	---	>6.0	---	---	20-40	Soft	Moderate	High-----	Low.
Trelona-----	C	None-----	---	---	>6.0	---	---	10-20	Soft	Low-----	Moderate	Low.
147, 148----- Keeline	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
149*: Keeline-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Kishona-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
150*: Keeline-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Kishona-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Theedle-----	C	None-----	---	---	>6.0	---	---	20-40	Soft	Low-----	High-----	Low.
151*: Keyner-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Slickspots-----												
152----- Kishona, sodic	C	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	High.
153*: Kishona-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Cambria-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
154*: Kishona-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Cambria-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Theedle-----	C	None-----	---	---	>6.0	---	---	20-40	Soft	Low-----	High-----	Low.
155----- Las Animas	C	Rare-----	---	---	1.5-3.0	Apparent	Mar-Jun	>60	---	Moderate	High-----	Low.
156*: Lithic Haplustolls-----		None-----	---	---	>6.0	---	---	10-20	Hard	---	---	---
Rock outcrop-----												
157*: Lithic Haplustolls-----		None-----	---	---	>6.0	---	---	10-20	Hard	---	---	---
Rock outcrop-----												
158----- Lohmiller	C	Rare-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Moderate.
159*: Lohmiller, saline	C	Rare-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Moderate.

Table 13.-Soil and Water Features--Continued

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" 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	Hydro-logic group	Flooding			High water table			Bedrock		Risk of corrosion		
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Potential frost action	Uncoated steel	Concrete
					Ft			In				
174*: Phiferson-----	B	None-----	---	---	>6.0	---	---	20-40	Soft	Moderate	High-----	Low.
Trelona-----	C	None-----	---	---	>6.0	---	---	10-20	Soft	Low-----	Moderate	Low.
175----- Pierre	D	None-----	---	---	>6.0	---	---	20-40	Soft	Low-----	High-----	Low.
176*: Pierre-----	D	None-----	---	---	>6.0	---	---	20-40	Soft	Low-----	High-----	Low.
Grummit-----	D	None-----	---	---	>6.0	---	---	10-20	Soft	Low-----	High-----	High.
177----- Recluse, dry	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
178*, 179*: Recluse-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
Cedak-----	B	None-----	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate	Low.
180*: Rhoame-----	C	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Bahl-----	C	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
181*: Rock outcrop												
182*: Rock outcrop----												
Tassel-----	D	None-----	---	---	>6.0	---	---	10-20	Soft	Low-----	High-----	Low.
183----- Samday	D	None-----	---	---	>6.0	---	---	10-20	Soft	Low-----	High-----	Low.
184*: Samday-----	D	None-----	---	---	>6.0	---	---	10-20	Soft	Low-----	High-----	Low.
Pierre-----	D	None-----	---	---	>6.0	---	---	20-40	Soft	Low-----	High-----	Low.
185*: Samday-----	D	None-----	---	---	>6.0	---	---	10-20	Soft	Low-----	High-----	Low.
Savageton-----	C	None-----	---	---	>6.0	---	---	20-40	Soft	Low-----	High-----	Low.
Bahl-----	C	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
186*: Savageton-----	C	None-----	---	---	>6.0	---	---	20-40	Soft	Low-----	High-----	Low.
Bahl-----	C	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
187*: Schamber-----	A	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Tulloch-----	B	None-----	---	---	>6.0	---	---	20-40	Soft	Low-----	Moderate	Low.
188----- Senlar	C	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
189*: Shingle-----	D	None-----	---	---	>6.0	---	---	10-20	Soft	Low-----	High-----	Low.
Rock outcrop----												
Samday-----	D	None-----	---	---	>6.0	---	---	10-20	Soft	Low-----	High-----	Low.

Table 13.-Soil and Water Features--Continued

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" 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	Hydro-logic group	Flooding			High water table			Bedrock		Risk of corrosion		
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Potential frost action	Uncoated steel	Concrete
					Ft			In				
190----- Silhouette	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
191*: Skilak-----	C	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Kishona-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
192*: Sunup-----	D	None-----	---	---	>6.0	---	---	10-20	Hard	Low-----	High-----	Low.
Rock outcrop-----												
193*: Taluca, cool-----	C	None-----	---	---	>6.0	---	---	10-20	Soft	Low-----	High-----	Low.
Keeline-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
194*: Taluca-----	C	None-----	---	---	>6.0	---	---	10-20	Soft	Low-----	High-----	Low.
Rock outcrop-----												
Shingle-----	D	None-----	---	---	>6.0	---	---	10-20	Soft	Low-----	High-----	Low.
195*: Taluca-----	C	None-----	---	---	>6.0	---	---	10-20	Soft	Low-----	High-----	Low.
Rock outcrop.												
Turnercrest-----	C	None-----	---	---	>6.0	---	---	20-40	Soft	Low-----	High-----	Low.
196*: Taluca-----	C	None-----	---	---	>6.0	---	---	10-20	Soft	Low-----	High-----	Low.
Shingle-----	D	None-----	---	---	>6.0	---	---	10-20	Soft	Low-----	High-----	Low.
197*: Taluca-----	C	None-----	---	---	>6.0	---	---	10-20	Soft	Low-----	High-----	Low.
Tullock-----	B	None-----	---	---	>6.0	---	---	20-40	Soft	Low-----	Moderate	Low.
Rock outcrop-----												
198*: Taluca-----	C	None-----	---	---	>6.0	---	---	10-20	Soft	Low-----	High-----	Low.
Turnercrest-----	C	None-----	---	---	>6.0	---	---	20-40	Soft	Low-----	High-----	Low.
Keeline-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
199*: Tassel-----	D	None-----	---	---	>6.0	---	---	10-20	Soft	Low-----	High-----	Low.
Ponderosa-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	Low-----	Low.
Rock outcrop-----												
200*: Tassel-----	D	None-----	---	---	>6.0	---	---	10-20	Soft	Low-----	High-----	Low.
Trelona-----	C	None-----	---	---	>6.0	---	---	10-20	Soft	Low-----	Moderate	Low.
Phiferon-----	B	None-----	---	---	>6.0	---	---	20-40	Soft	Moderate	High-----	Low.
201*: Terro-----	C	None-----	---	---	>6.0	---	---	20-40	Soft	Low-----	High-----	Low.

Table 13.-Soil and Water Features--Continued

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" 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	Hydro-logic group	Flooding			High water table			Bedrock		Risk of corrosion		
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Potential frost action	Uncoated steel	Concrete
					Ft			In				
201: (cont.) Turnercrest-----	C	None-----	---	---	>6.0	---	---	20-40	Soft	Low-----	High-----	Low.
202*: Terro-----	C	None-----	---	---	>6.0	---	---	20-40	Soft	Low-----	High-----	Low.
Vonalee-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
203*: Terro-----	C	None-----	---	---	>6.0	---	---	20-40	Soft	Low-----	High-----	Low.
Vonalee-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Taluce-----	C	None-----	---	---	>6.0	---	---	10-20	Soft	Low-----	High-----	Low.
204*, 205*: Theedle-----	C	None-----	---	---	>6.0	---	---	20-40	Soft	Low-----	High-----	Low.
Kishona-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
206*: Theedle-----	C	None-----	---	---	>6.0	---	---	20-40	Soft	Low-----	High-----	Low.
Kishona-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Shingle-----	D	None-----	---	---	>6.0	---	---	10-20	Soft	Low-----	High-----	Low.
207----- Thirty-nine	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
208*: Thirty-nine-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
Kadoka-----	C	None-----	---	---	>6.0	---	---	20-40	Soft	Moderate	High-----	Low.
209*: Threetop-----	C	None-----	---	---	>6.0	---	---	20-40	Hard	Low-----	High-----	Low.
Sunup-----	D	None-----	---	---	>6.0	---	---	10-20	Hard	Low-----	High-----	Low.
210*: Torrington-----	B	None-----	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate	Low.
Julesburg-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
211----- Torriorthents		None-----	---	---	>6.0	---	---	10-40	Soft	---	---	---
212*: Trelona-----	C	None-----	---	---	>6.0	---	---	10-20	Soft	Low-----	Moderate	Low.
Phiferson-----	B	None-----	---	---	>6.0	---	---	20-40	Soft	Moderate	High-----	Low.
Vetal-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
213----- Ulm	C	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
214*: Ulm-----	C	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Bidman-----	C	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
215*: Ulm-----	C	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Forkwood-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.

Table 13.-Soil and Water Features--Continued

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" 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	Hydro-logic group	Flooding			High water table			Bedrock		Risk of corrosion		
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Potential frost action	Uncoated steel	Concrete
					Ft			In				
216----- Ustic Torriorthents		None-----	---	---	>6.0	---	---	10-40	Soft	---	---	---
217*: Ustic Torriorthents, cool-----		None-----	---	---	>6.0	---	---	>10	Soft	---	---	---
Torriorthentic Haplustolls-----		None-----	---	---	>6.0	---	---	10-40	Soft	---	---	---
Rock outcrop-----												
218, 219----- Vetal	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
220*, 221*: Vetal-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
Phiferson-----	B	None-----	---	---	>6.0	---	---	20-40	Soft	Moderate	High-----	Low.
222----- Vonalee	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
223*: Vonalee-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Keeline-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 14.-Classification of the Soils

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Absted-----	Fine, montmorillonitic, mesic Haplustollic Natrargids
Albinas-----	Fine-loamy, mixed, mesic Pachic Argiustolls
Alice-----	Coarse-loamy, mixed, mesic Aridic Haplustolls
Arvada-----	Fine, montmorillonitic, mesic Ustollic Natrargids
Bahl-----	Fine, montmorillonitic (calcareous), mesic Ustertic Torriorthents
Bayard-----	Coarse-loamy, mixed, mesic Torriorthentic Haplustolls
Bidman-----	Fine, montmorillonitic, mesic Ustollic Paleargids
Bowbac-----	Fine-loamy, mixed, mesic Ustollic Haplargids
Brownrigg-----	Loamy-skeletal, mixed, mesic, shallow Aridic Argiustolls
Bumbob-----	Very-fine, montmorillonitic, mesic Ustertic Camborthids
Busher-----	Coarse-loamy, mixed, mesic Aridic Haplustolls
Cadoma-----	Fine, montmorillonitic, mesic Ustollic Camborthids
Cambria-----	Fine-loamy, mixed, mesic Ustollic Haplargids
Cedak-----	Fine-loamy, mixed, mesic Aridic Argiustolls
Clarkelen-----	Coarse-loamy, mixed (calcareous), mesic Ustic Torrifluvents
Coaliams-----	Fine-loamy, mixed, mesic Torrifluventic Haplustolls
Cushman-----	Fine-loamy, mixed, mesic Ustollic Haplargids
Dailey-----	Sandy, mixed, mesic Torriorthentic Haplustolls
Draknab-----	Sandy, mixed, mesic Ustic Torrifluvents
Dwyer-----	Mixed, mesic Ustic Torripsamments
Epping-----	Loamy, mixed (calcareous), mesic, shallow Ustic Torriorthents
Featherlegs-----	Fine-loamy, mixed, mesic Aridic Argiustolls
Forkwood-----	Fine-loamy, mixed, mesic Ustollic Haplargids
Grummit-----	Clayey, montmorillonitic, acid, mesic, shallow Ustic Torriorthents
Hargreave-----	Fine-loamy, mixed, mesic Aridic Argiustolls
Haverdad-----	Fine-loamy, mixed (calcareous), mesic Ustic Torrifluvents
Hiland-----	Fine-loamy, mixed, mesic Ustollic Haplargids
Hilight-----	Clayey, montmorillonitic, nonacid, mesic, shallow Ustic Torriorthents
Jayem-----	Coarse-loamy, mixed, mesic Aridic Haplustolls
Julesburg-----	Coarse-loamy, mixed, mesic Aridic Argiustolls
Kadoka-----	Fine-silty, mixed, mesic Aridic Argiustolls
Keeline-----	Coarse-loamy, mixed (calcareous), mesic Ustic Torriorthents
Keyner-----	Fine-loamy, mixed, mesic Haplustollic Natrargids
Kishona-----	Fine-loamy, mixed (calcareous), mesic Ustic Torriorthents
Lambman-----	Loamy, mixed, mesic, shallow Aridic Argiustolls
Las Animas-----	Coarse-loamy, mixed (calcareous), mesic Typic Fluvaquents
Lohmiller-----	Fine, montmorillonitic (calcareous), mesic Ustic Torrifluvents
Manter-----	Coarse-loamy, mixed, mesic Aridic Argiustolls
Manzanola-----	Fine, montmorillonitic, mesic Ustollic Haplargids
Midway-----	Clayey, montmorillonitic (calcareous), mesic, shallow Ustic Torriorthents
Minnequa-----	Fine-silty, mixed (calcareous), mesic Ustic Torriorthents
Moskee-----	Fine-loamy, mixed, mesic Aridic Argiustolls
Noden-----	Fine-loamy, mixed, mesic Aridic Argiustolls
Orella-----	Clayey, mixed (calcareous), mesic, shallow Ustic Torriorthents
Orpha-----	Mixed, mesic Ustic Torripsamments
Paiges-----	Fine, montmorillonitic, mesic Entic Haplumbrepts
Petrie-----	Fine, montmorillonitic (calcareous), mesic Ustertic Torriorthents
Phiferon-----	Coarse-loamy, mixed, mesic Aridic Haplustolls
Pierre-----	Fine, montmorillonitic, mesic Typic Torrerts
Ponderosa-----	Coarse-loamy, mixed, mesic Torriorthentic Haplustolls
Recluse-----	Fine-loamy, mixed, mesic Aridic Argiustolls
Rhoame-----	Fine, montmorillonitic, nonacid, mesic Ustic Torriorthents
Samday-----	Clayey, montmorillonitic (calcareous), mesic, shallow Ustic Torriorthents
Savageton-----	Fine, montmorillonitic, mesic Ustollic Camborthids
Schamber-----	Sandy-skeletal, mixed, mesic Ustic Torriorthents
Senlar-----	Fine-silty, mixed, mesic Ustollic Camborthids
Shingle-----	Loamy, mixed (calcareous), mesic, shallow Ustic Torriorthents
Silhouette-----	Fine, montmorillonitic, mesic Ustollic Camborthids
Skilak-----	Fine-silty, mixed (calcareous), mesic Ustic Torriorthents
*Sunup-----	Loamy-skeletal, mixed (calcareous), mesic Lithic Ustic Torriorthents

Table 14.-Classification of the Soils--Continued

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Taluce-----	Loamy, mixed (calcareous), mesic, shallow Ustic Torriorthents
Tassel-----	Loamy, mixed (calcareous), mesic, shallow Ustic Torriorthents
Terro-----	Coarse-loamy, mixed, mesic Ustollic Haplargids
Theedle-----	Fine-loamy, mixed (calcareous), mesic Ustic Torriorthents
Thirtynine-----	Fine-silty, mixed, mesic Aridic Argiustolls
Threetop-----	Fine-loamy, mixed, mesic Ustollic Haplargids
Torrington-----	Coarse-loamy, mixed, mesic Aridic Argiustolls
Trelona-----	Loamy, mixed, mesic, shallow Torriorthentic Haplustolls
Tulloch-----	Mixed, mesic Ustic Torrripsamments
Turnercrest-----	Coarse-loamy, mixed (calcareous), mesic Ustic Torriorthents
Ulm-----	Fine, montmorillonitic, mesic Ustollic Haplargids
Vetal-----	Coarse-loamy, mixed, mesic Pachic Haplustolls
Vonalee-----	Coarse-loamy, mixed, mesic Ustollic Haplargids
Wolf-----	Fine-loamy, mixed, mesic Aridic Argiustolls

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