to allow moisture accumulation. Generally precipitation is too low to make beneficial use of fertilizer.

Stubble mulch farming, stripcropping, and minimum tillage are needed to control soil blowing and water erosion. Terracing also may be needed to control water erosion.

The potential native vegetation is dominated by western wheatgrass and blue grama. Buffalograss is also present. Potential production ranges from 1,000 pounds per acre in favorable years to 600 pounds in unfavorable years. As range condition deteriorates, a blue grama-buffalograss sod forms. Undesirable weeds and annuals invade the site as range condition becomes poorer.

Management of vegetation on this soil should be based on taking half and leaving half of the total annual production. Range pitting can reduce runoff. Seeding is desirable if the range is in poor condition. Western wheatgrass, blue grama, sideoats grama, buffalograss, pubescent wheatgrass, and crested wheatgrass are suitable for seeding. The grass selected should meet the seasonal requirements of livestock. It can be seeded into a clean, firm sorghum stubble, or it can be drilled into a firm prepared seedbed. Seeding early in spring has proven most successful.

Windbreaks and environmental plantings of trees and shrubs commonly grown in the area are generally well suited to this soil. Cultivation to control competing vegetation should be continued for as many years as possible following planting. Trees that are best suited and have good survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, Siberian elm, Russian-olive, and hackberry. The shrubs best suited are skunkbush sumac, lilac, Siberian peashrub, and American plum.

Wildlife is an important secondary use of this soil. The cropland areas provide favorable habitat for ring-necked pheasant and mourning dove. Many nongame species can be attracted by establishing areas for nesting and escape cover. For pheasants, undisturbed nesting cover is essential and should be included in plans for habitat development, especially in areas of intensive agriculture. Rangeland wildlife, for example, the pronghorn antelope, can be attracted by developing livestock watering facilities, managing livestock grazing, and reseeding where needed.

This soil has poor potential for urban and recreational development. Slow permeability and high shrink swell cause problems in dwelling and road construction. Capability subclass IIIe irrigated, IVe nonirrigated; Clayey Plains range site.

68—Ustic Torriorthents, moderately steep. These are deep, excessively drained soils on terrace breaks and escarpments at elevations of 4,450 to 5,100 feet. They formed in gravelly alluvium and have slopes of 9 to 25 percent. Included in mapping are small areas of soils that have pockets of sandy loam and loam in the underlying material.

Typically the surface layer is pale brown gravelly sand about 10 inches thick. The underlying material to a depth of 60 inches is pale brown gravelly sand.

Permeability is rapid. Available water capacity is low. The effective rooting depth is 60 inches or more. Surface runoff is medium, and the erosion hazard is moderate.

The potential native vegetation is dominated by little bluestem, sideoats grama, sand reedgrass, blue grama, hairy grama, switchgrass, and needleandthread. Potential production ranges from 700 pounds per acre in favorable years to 200 pounds in unfavorable years. As range condition deteriorates, the tall and mid grasses decrease, blue grama and hairy grama increase, and forage production drops.

Management of vegetation should be based on taking half or less of the total annual production. Deferred grazing is practical in improving range condition. Seeding and mechanical treatment are impractical.

Windbreaks and environmental plantings generally are not suited to these soils. Onsite investigation is needed to determine if plantings are feasible.

Wildlife populations are limited because the necessary habitat elements are lacking. Because most of the acreage is rangeland, only rangeland wildlife, for example scaled quail and antelope, are typical. Extreme care is needed in managing livestock grazing in order to provide suitable habitat on these soils.

Potential is poor for urban and recreational development. The chief limiting soil features are the loose, coarse textured soil, steep slopes, and rapid permeability. Capability subclass VIIs irrigated, VIIs nonirrigated; Gravel Breaks range site.

69—Valent sand, 0 to 3 percent slopes. This is a deep, excessively drained soil on plains at elevations of 4,650 to 5,100 feet. It formed in eolian deposits. Included in mapping are small areas of soils that have lime within a depth of 40 inches.

Typically the surface layer is brown sand about 8 inches thick. The underlying material to a depth of 60 inches is brown sand.

Permeability is rapid. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Surface runoff is slow, and the erosion hazard is low.

This soil is suited to limited cropping. Intensive cropping is hazardous because of erosion. The cropping system should be limited to such close grown crops as alfalfa, wheat, and barley. The soil also is suited to irrigated pasture. A suitable cropping system is 3 to 4 years of alfalfa followed by 2 years of corn and small grain and alfalfa seeded with a nurse crop.

Closely spaced contour ditches or sprinkers can be used in irrigating close grown crops. Contour furrows or sprinklers should be used for new crops. Applications of barnyard manure and commercial fertilizer help to maintain good production.

The potential vegetation is dominated by sand bluestem, sand reedgrass, switchgrass, sideoats grama, needleandthread, little bluestem, and blue grama. Potential production ranges from 2,500 pounds per acre in favorable years to 1,800 pounds in unfavorable years. As

range condition deteriorates, the sand bluestem, switchgrass, sand reedgrass, sideoats grama, and little bluestem decrease, forage production drops, and sand sage increases. Undesirable weeds and annuals invade and "blowout" conditions can occur as range condition becomes poorer.

Management of vegetation on this soil should be based on taking half and leaving half of the total annual production. Seeding is desirable if the range is in poor condition. Sand bluestem, sand reedgrass, indiangrass, switchgrass, sideoats grama, little bluestem, and blue grama are suitable for seeding. Because this soil is susceptible to soil blowing, it should be seeded using an interseeder, or the seed should be drilled into a firm, clean sorghum stubble. Seeding early in spring has proven most successful. Brush management also can help in improving deteriorated range.

Windbreaks and environmental plantings are fairly well suited to this soil. Blowing sand and the moderate available water capacity are the principal hazards in establishing trees and shrubs. The soil is so loose that trees should be planted in shallow furrows, maintaining vegetation between the rows. Supplemental irrigation is needed to insure survival. Trees that are best suited and have good survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, and Siberian elm. The shrubs best suited are skunkbush sumac, lilac, and Siberian peashrub.

Wildlife is an important secondary use of this soil. The cropland areas provide favorable habitat for ring-necked pheasant and mourning dove. Many nongame species can be attracted by establishing areas for nesting and escape cover. For pheasants, undisturbed nesting cover is essential and should be included in plans for habitat development, especially in areas of intensive agriculture. Rangeland wildlife, for example, the pronghorn antelope, can be attracted by developing livestock watering facilities, managing livestock grazing, and reseeding where needed.

This soil has fair potential for urban development. The primary limiting soil features are the rapid permeability and the susceptibility to soil blowing. Septic tank absorption fields function properly, but in places the sandy substratum does not properly filter the leachate. Sewage lagoons must be sealed. Once established, the lawns, shrubs, and trees grow well. Capability subclass IVe irrigated, VIe nonirrigated; Deep Sand range site.

70—Valent sand, 3 to 9 percent slopes. This is a deep, excessively drained soil on plains at elevations of 4,650 to 5,100 feet. It formed in eolian deposits. Included in mapping are small areas of soils that have lime within a depth of 40 inches. Also included are small areas of soils that have sandstone between 40 and 60 inches.

Typically the surface layer of the Valent soil is brown sand about 6 inches thick. The underlying material to a depth of 60 inches is brown sand.

Permeability is rapid. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Surface runoff is slow, and the erosion hazard is low.

The potential vegetation is dominated by sand bluestem, sand reedgrass, switchgrass, sideoats grama, needleandthread, little bluestem, and blue grama. Potential production ranges from 2,500 pounds per acre in favorable years to 1,800 pounds in unfavorable years. As range condition deteriorates, the sand bluestem, switchgrass, sand reedgrass, sideoats grama, and little bluestem decrease, forage production drops, and sand sage increases. Undesirable weeds and annuals invade and "blowout" conditions can occur as range condition becomes poorer.

Management of vegetation on this soil should be based on taking half and leaving half of the total annual production. Seeding is desirable if the range is in poor condition. Sand bluestem, sand reedgrass, indiangrass, switchgrass, side-oats grama, little bluestem, and blue grama are suitable for seeding. Because this soil is susceptible to soil blowing, it should be seeded using an interseeder or the seed should be drilled into a firm, clean sorghum stubble. Seeding early in spring has proven most successful. Brush management can also help in improving deteriorated range.

Windbreaks and environmental plantings are generally not suited to this soil. Onsite investigation is needed to determine if plantings are feasible.

Wildlife is an important secondary use of this soil. Rangeland wildlife, for example, the pronghorn antelope, can be attracted by developing livestock watering facilities, managing livestock grazing, and reseeding where needed.

This soil has fair potential for urban development. The chief limiting soil features are the rapid permeability and the susceptibility to soil blowing. Septic tank absorption fields function properly, but in places the sandy substratum does not properly filter the leachate. Sewage lagoons must be sealed. Once established, lawns, shrubs, and trees grow well. Capability subclass VIe irrigated, VIe nonirrigated; Deep Sand range site.

71—Valent-Loup complex, 0 to 9 percent slopes. This level to moderately sloping map unit occupies hills, ridges, and depression or pothole-like areas in the sandhills at elevations of 4,670 to 4,700 feet. The Valent soil makes up about 60 percent of the unit, the Loup soil about 35 percent. About 5 percent is dune sand. The Valent soil occupies the hills and ridges and the Loup soil the depressions or potholes.

The Valent soil is deep and excessively drained. It formed in eolian deposits. Typically the surface layer is brown sand about 8 inches thick. The underlying material to a depth of 60 inches is brown sand.

Permeability is rapid. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Surface runoff is slow, and the erosion hazard is low.

The Loup soil is deep and poorly drained. It formed in sandy alluvium. Typically the surface layer is very dark grayish brown, mottled loamy sand about 16 inches thick. The underlying material to a depth of 60 inches is light brownish gray, mottled loamy sand and sandy loam.