Series 1960, No. 19 Issued August 1964

SOIL SURVEY

Jefferson County Pennsylvania

OUR SOIL ★ OUR STRENGTH

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
THE PENNSYLVANIA STATE UNIVERSITY
College of Agriculture and Agricultural Experimental Station
and the
PENNSYLVANIA DEPARTMENT OF AGRICULTURE
State Soil and Water Conservation Commission

HOW TO USE THE SOIL SURVEY REPORT

THIS SOIL SURVEY of Jefferson County, Pa., will serve several groups of readers. It will help farmers in planning the kind of management that will protect their soils and provide good yields; assist engineers in selecting sites for roads, buildings, ponds, and other structures; aid foresters in managing woodland; and add to our knowledge of soil science.

Locating Soils

Use the index to map sheets at the back of this report to locate areas on the large map. The index is a small map of the county on which numbered rectangles have been drawn to show where each sheet of the large map is located. When the correct sheet of the large map has been found, it will be seen that boundaries of the soils are outlined, and that there is a symbol for each kind of soil. All areas marked with the same symbol are the same kind of soil, wherever they occur on the map. The symbol is inside the area if there is enough room; otherwise, it is outside the area and a pointer shows where the symbol belongs.

Finding Information

This report contains sections that will interest different groups of readers, as well as some sections that may be of interest to all.

Farmers and those who work with farmers can learn about the soils in the section "Descriptions of Soils" and then turn to the section "Use and Management of the Soils." In this way, they first identify the soils on their farm and then learn how these soils can be managed and what yields can be expected. The "Guide to Mapping Units, Capability Units, and Woodland Suitability Groups" at the back of the report will simplify use of the map and report. This guide lists each soil and land type mapped in the county, and the page where each is described. It also lists, for each soil and land type, the capability unit and woodland suitability group, and the pages where each of these is described.

Foresters and others interested in woodland can refer to the section "Use of Soils for Woodland." In that section the soils in the county are grouped according to their suitability for trees, and factors affecting the management of woodland are explained.

Those interested in wildlife can refer to the section "Suitability of the Soils for Wildlife." That section gives information about the suitability of the soils in the county for supporting wildlife.

Engineers and builders will want to refer to the section "Engineering Applications." Tables in that section show characteristics of the soils that affect engineering.

Persons interested in science will find information about how the soils were formed and how they were classified in the section "Formation, Morphology, and Classification of Soils."

Students, teachers, and other users will find information about soils and their management in various parts of the report, depending on their particular interests.

Newcomers in Jefferson County will be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the section "General Nature of the Area," which gives additional information about the county.

* * *

Fieldwork for this survey was completed in 1960. Unless otherwise indicated, all statements in the report refer to conditions in the county at that time. The soil survey of Jefferson County was made as part of the technical assistance furnished by the Soil Conservation Service to the Jefferson County Soil Conservation District.

U.S. GOVERNMENT PRINTING OFFICE: 1964

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402

Contents

Series 1960, No. 19

Issued August 1964

SOIL SURVEY OF JEFFERSON COUNTY, PENNSYLVANIA

BY JOHN ZARICHANSKY, WALTER J. STEPUTIS, J. ROBERT CERUTTI, HORACE R. HARWELL, LESTER SEGLIN, AND JAMES HIXSON, SOIL CONSERVATION SERVICE, UNITED STATES DEPARTMENT OF AGRICULTURE

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH THE PENNSYLVANIA STATE UNIVERSITY, COLLEGE OF AGRICULTURE AND AGRICULTURAL EXPERIMENT STATION, AND THE PENNSYLVANIA DEPARTMENT OF AGRICULTURE, STATE SOIL AND WATER CONSERVATION COMMISSION

JEFFERSON COUNTY is in the fourth tier of counties east of Ohio and in the third tier south of New York State (fig. 1). The total area of the county is 652 square miles, or 417,280 acres. Brookville, the county seat, is about 6 miles west of the geographical center of the county. Punxsutawney, in the southern part, is the largest city.

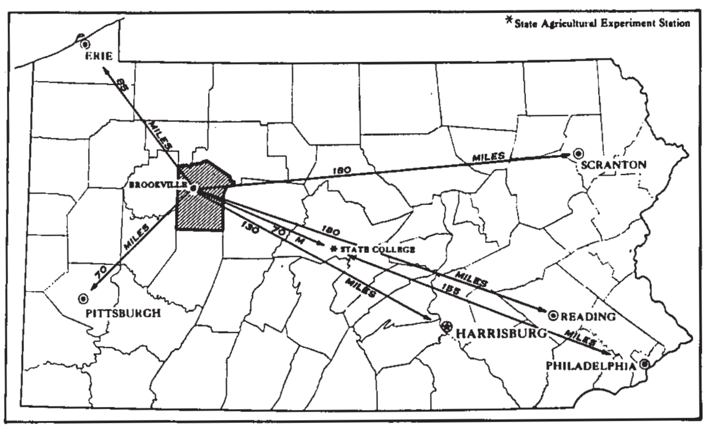

Figure 1.—**Location of Jefferson County in Pennsylvania.**

Farming and lumbering are among the chief industries in the county. Forests, mostly second and third growth, cover more than 60 percent of the land area. The major trees are oak, maple, hickory, white pine, and hemlock. The chief farm crops grown are hay, corn, oats, and wheat. Most of the crops are fed to livestock on the farms. Dairy and beef cattle are the principal kinds of livestock. There is an increasing trend toward the raising of cattle.

How Soils Are Mapped and Classified

Soil scientists made this survey to learn what kinds of soils are in Jefferson County, where they are located, and how they can be used.

They went into the county knowing they likely would find many soils they had already seen, and perhaps some they had not. As they traveled over the county, they observed steepness, length, and shape of slopes; size and speed of streams; kinds of native plants or crops; kinds of rocks; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by roots of plants.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures (*13*, *16*).[1] To use this report efficiently, it is necessary to know the kinds of groupings most used in a local soil classification.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Cavode and Dekalb, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that go with their behavior in the natural, untouched landscape. Soils of one series can differ somewhat in texture of the surface layer and in slope, stoniness, or some other characteristic that affects use of the soils by man.

Many soil series contain soils that differ in the texture of their surface layer. According to such differences in texture, separations called soil types are made. Within a series, all the soils having a surface layer of the same texture belong to one soil type. Cavode silt loam and Cavode silty clay loam are two soil types in the Cavode series. The difference in the texture of their surface layers is apparent from their names.

Some soil types vary so much in slope, degree of erosion, number and size of stones, or some other feature affecting their use, that practical suggestions about their management could not be made if they were shown on the soil map as one unit. Such soil types are divided into soil phases. The name of a soil phase indicates a feature that affects management. For example, Cavode silt loam,

[1] Italic numbers in parentheses refer to Literature Cited, p. 89.

3 to 8 percent slopes, is one of several phases of Cavode silt loam, a soil type that ranges from nearly level to steep.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew soil boundaries of the individual soil on aerial photographs. These photographs show woodland, buildings, field borders, trees, and other details that greatly help in drawing boundaries accurately. The soil map in the back of this report was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning management of farms and fields, a mapping unit is nearly equivalent to a soil type or a phase of a soil type. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil type or soil phase.

In preparing some detailed maps, the soil scientists have a problem of delineating areas where different kinds of soils are so intricately mixed, and in such small individual tracts that it is not practical to show them separately on the map. Therefore, they show this mixture of soils as one mapping unit and call it a soil complex. Ordinarily, a soil complex is named for the major kinds of soil in it, for example, Gilpin-Upshur silty clay loams. If two or more soils that do not occur in regular geographic association have differences too slight to justify mapping them separately, they are mapped together in an undifferentiated mapping unit. An example is Gilpin and Montevallo soils, 35 to 60 percent slopes. Also, on most soil maps, areas are shown that are so rocky, so shallow, or so frequently worked by wind and water that they scarcely can be called soils. These areas are shown on a soil map like other mapping units, but they are given descriptive names, such as Gullied land or Mine dumps, and are called land types rather than soils.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soils in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soils. Yields under defined management are estimated for all the soils.

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in a way that it is readily useful to different groups of readers, among them farmers, managers of woodland, engineers, and homeowners. Grouping soils that are similar in suitability for each specified use is the method of organization commonly used in the soil survey reports. Based on the yield and practice tables and on other data, the soil scientists set up trial groups, and test them by further study and by consultation with farmers, agronomists, engineers, and others. Then, the scientists adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

The scientists made a detailed map and also a general map of the soils. The detailed map consists of 52 sheets at a scale of 1:20,000, which is about 3.17 inches to 1 mile. It shows mapping units that are mostly single kinds of soil. The general soil map, on one sheet at a much smaller scale, shows patterns rather than the separate kinds of soil.

Each kind of pattern shown on the general soil map has in it several soils. The soils can differ greatly among themselves, but the pattern they form is fairly consistent throughout its extent.

In the northern end of the county, for example, one kind of soil pattern lies on the steep, sandy slopes that border the Clarion River, Toby Creek, North Fork, and some of the other streams. Between the large streams, the ridges and rolling slopes have on them another pattern of deeper, sandy soils. In the central and southwestern parts of the county, the main soils are mostly rolling and moderately deep, and on several broad flats the important soils have a clay subsoil and are somewhat wet. Near the southeastern corner are large areas of hilly to steep soils underlain by shale or sandstone. Nine kinds of soil patterns have been described and are shown on the colored general soil map.

A pattern of soils that forms a unit on a general soil map is called a soil association. Each soil association is named for one or more of the major soils in it; for example, the Dekalb-Leetonia association contains mostly steep, stony soils of those two series, but also smaller bodies of other soils.

The general soil map is useful to people who want quickly an idea of the soil patterns in the county. It shows in a very general way the areas of steep and stony soils, those of rolling soils good for farming, the areas in which many of the soils need to be drained before they can be farmed, and other broad relationships. The general map does not show the kind of soil at any place, but gives an idea of the main kinds of soil in that general location.

Soils of flood plains are not shown separately on the general map, but they form small parts of each soil association. They are in narrow bands in nearly level areas along streams. The bands are so narrow that, in most places, they could not be shown separately on the general map.

The main soils of the flood plains are those of the Pope, Philo, and Atkins series. The Pope soils are well drained, and in some places they have a sandy texture throughout the profile. The Philo soils are moderately well drained and are mottled in the lower part of the subsoil. The Atkins soils are poorly drained. They are wet most of the time, unless they have had artificial drainage.

The soils of one or more of the Pope, Philo, and Atkins series make up part of nearly every farm that lies along a stream or a small tributary. Frequency of flooding and the degree of natural drainage affect the use of the soils for crops and pasture. If flooding is not too frequent, the Pope and Philo soils are excellent for crops.

1. Cavode-Brinkerton-Armagh Association

Somewhat poorly drained and poorly drained soils of uplands, on clay shale

The main soils of this association are on broad upland flats and gentle slopes that are underlain by clay shale. The Cavode soils are moderately deep or deep, somewhat poorly drained, and gently or strongly sloping. The Brinkerton and Armagh soils are moderately deep or deep, poorly drained, and nearly level or gently sloping. In many places they are within areas of the Cavode soils.

Minor soils in this association are those of the Wharton, Gilpin, and Wellston series. The Wharton soils are nearly level to strongly sloping and are moderately well drained. The Gilpin and Wellston soils are well drained and are underlain by sandstone or shale bedrock. In a few places where limestone is near the surface, well drained Westmoreland soils and moderately well drained Guernsey soils occur.

The soils of this association also occupy small areas in the Gilpin-Montevallo-Ernest association and in the Gilpin-Wellston-Ernest association. They are generally in bands between well drained soils that formed in residuum and moderately well drained soils that formed in colluvium.

Strip mining is extensive in this association, especially within areas of the steeper Gilpin soils. In some places mining operations have made the soils of an entire farm unsuitable for crops.

Dairy farming is common on the soils of this association. Pasture crops, cultivated crops, and hay grow well. Wet spots occur in many places, and such practices as stripcropping, terracing, and artificial drainage are necessary in most areas.

2. Cookport-Hartsells-Dekalb Association

Soils from sandstone on broad ridgetops and on slopes

The soils of this association are mainly on sloping ridges and in rolling areas on broad ridgetops. They cover most of the northern part of the county, and they also occur at a higher elevation in the southern part. The Cookport, Hartsells, and Dekalb soils formed chiefly in material weathered from sandstone, and they are generally coarse textured.

The Cookport soils are moderately deep or deep and are moderately well drained. They are on broad ridgetops and on sloping ridges. The Cookport soils have a characteristic fragipan in their subsoil, and in many places they have large sandstone boulders on the surface. The Hartsells soils are deep, well drained, and nearly level or gently sloping. They are mainly on the tops of plateaus. The Dekalb soils are shallow to moderately deep and are mainly on hillsides. In many places they are channery, and in a few places they are stony.

Minor areas of Cavode, Brinkerton, Armagh, and Gilpin soils are near the boundaries of this association. On the toe slopes bordering narrow valleys are bands of moderately well drained Ernest and poorly drained Brinkerton and Armagh soils. The very wet Brinkerton soils are in small, nearly level or concave areas that are generally ponded in wet seasons. Long, narrow bands of well drained Pope, moderately well drained Philo, and poorly drained Atkins soils are along small, narrow streams in many places. Small areas of Nolo soils, which are poorly drained and are shallow over a hard, brittle subsoil, are in the uplands.

This soil association comprises much of the forested acreage in this county. Most of the forests have been cut over, but the trees in the second-growth stands are large enough to produce sawlogs as well as chemical wood and pulpwood. Dairy farms and farms where beef cattle are raised are common on the less sandy soils that have been cleared and used for farming. A large part of the cleared acreage is no longer farmed but is reverting to trees and brush or is used for pasture (fig. 2). Most of the small farms are operated on a part-time basis.

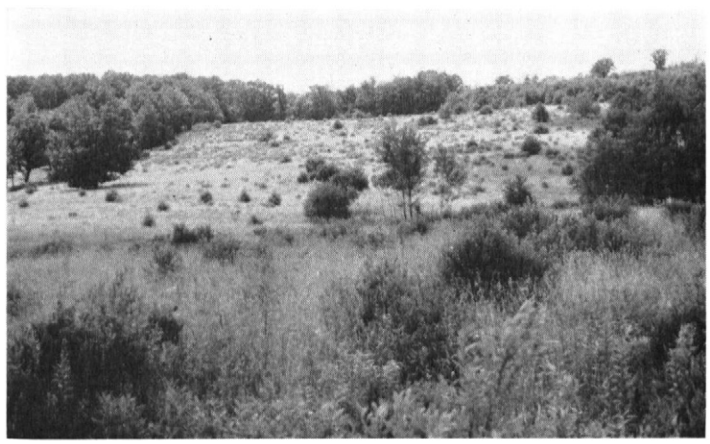

Figure 2.—Areas of Cookport and Dekalb soils, of association 2, in farmland that is reverting to woodland.

3. Dekalb-Leetonia Association

Steep, hilly, stony, well-drained soils

The soils in this association are along the steep slopes near the Clarion River and Toby Creek in the northern part of the county. The Dekalb and Leetonia soils are well drained, and they are coarse textured. In many places they are droughty. Sandstone and conglomerate boulders from 1 foot to as much as 20 feet in diameter are on the surface and throughout the profile (fig. 3).

All of this association is in trees, and much of the understory is a dense growth of rhododendron. Most of the areas are too steep and stony for farming.

4. Gilpin-Montevallo-Ernest Association

Hilly to steep, shallow to moderately deep, shaly and silty soils

The main soils of this association are on rolling uplands, steep hillsides, and the lower slopes and benches. The Gilpin and Montevallo soils are in the uplands, and the Ernest soils are in the valleys. The Gilpin soils are shallow to moderately deep and are well drained. They developed in material weathered from acid siltstone, shale, and some sandstone. The Montevallo soils are shallow and well drained. They are underlain by horizontal beds of shale, siltstone, and sandstone. The Ernest soils are deep and moderately well drained or somewhat poorly drained. They were formed in colluvium and are on the lower slopes and benches, where soil material accumulates from the upper slopes through gravity, erosion, or landslides.

Figure 3.—**Steep, stony Dekalb soils of association 3.**

The Shelocta soils, which are better drained than the Ernest soils, and the Brinkerton, which are more poorly drained, are also on the lower slopes where soil material has accumulated to a considerable depth. Other minor soils in the association are the Brinkerton, Armagh, Cavode, and Wharton soils, which are in the uplands. Along the streams are well drained Pope soils, moderately well drained Philo, and poorly drained Atkins soils. These soils are in bands on the flood plains. Strip mines and Mine dumps are also extensive. In the area between Punxsutawney and Walston, Gullied land dominates on the hillsides adjacent to old coke ovens.

Dairy farms are prevalent in this association, but general farms are common. Many farms, especially those where Montevallo soils are dominant, have been planted to Christmas trees or are farmed by operators who farm part time and derive part of their income from other sources. There are some improved pastures on most of the farms. The pastures are generally on thin, moderately steep or steep soils that are low in productivity. Brush and weeds encroach because it is difficult to keep the pastures clipped. There are woodlots on most of the farms.

5. Gilpin-Upshur Association

Well-drained, reddish, clayey soils on interbedded red and gray shale

The soils of this association are on gently sloping uplands and on benches in small, scattered areas in the southeastern part of the county. The association contains Gilpin soils underlain by gray and brown shale, mixed with Upshur soils, underlain by red shale. The soils of both series are well drained, but the Upshur soils have a clayey subsoil. When they are wet, the Upshur soils are plastic and are difficult to work.

Most of the acreage is cultivated. The soils are suitable for farming, but they are in such small areas that they are managed with the adjacent soils.

6. Gilpin-Wellston-Ernest Association

Rolling, shallow to deep, well drained and moderately well drained, silty soils

The topography of this association is similar to that of the Gilpin-Montevallo-Ernest association. The major soils are on rolling plateaus, on long slopes, and on the lower parts of slopes. The Gilpin and Wellston soils are the principal upland soils, and the Ernest soils are on the lower slopes. The Gilpin soils are shallow to moderately deep and are well drained. They were formed in material weathered from acid siltstone, shale, and sandstone. The Wellston soils are similar to the Gilpin, but they are deeper and have more clay in the subsoil. The Ernest soils are deep and are moderately well drained or somewhat poorly drained. They were formed in acid colluvium.

This association contains minor soils similar to those in the Gilpin-Montevallo-Ernest association. The main soils are similar also, except that the deep Wellston soils instead of the shallow Montevallo soils are codominant with the Gilpin and Ernest soils. The wide ridges have favored the development of the Wellston soils, but there are significant areas of Montevallo soils.

Coal mining is extensive in this area, and there are numerous areas of Mine dumps and Strip mines (fig. 4). The type of farming is similar to that in the Gilpin-Montevallo-Ernest association.

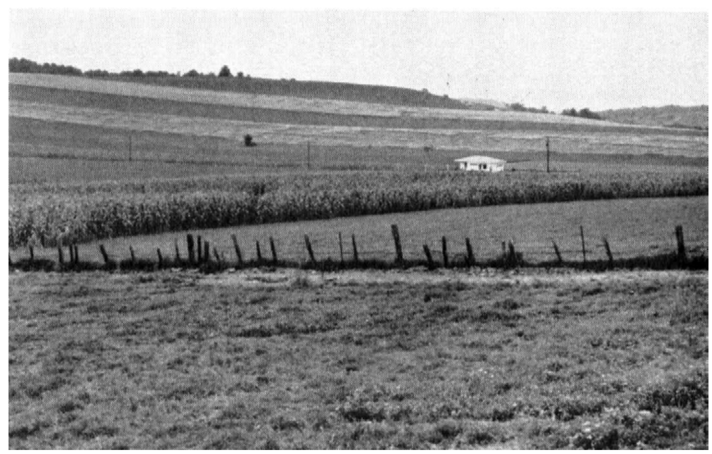

Figure 4.—**Rolling slopes of the Gilpin-Wellston-Ernest association. In the fields in the background, contour stripcropping has been replaced by contour strip mining.**

7. Guernsey-Westmoreland Association

Moderately well drained or well drained soils containing some lime

The soils of this association are largely gently sloping and moderately steep. They are in the uplands where the bedrock contains some limestone or limy material. These soils are in small, scattered areas where limestone is near the surface or appears as an outcrop. The Guernsey soils are moderately well drained or somewhat poorly drained and have a subsoil of silty clay. The Westmoreland soils are well drained and have a subsoil that is less clayey than that of the Guernsey soils.

These soils are well suited to farm crops, but in some places artificial drainage is needed to remove excess surface and subsurface water. These soils are occupied mostly by farms where the raising of dairy cattle or beef cattle is a specialty. Much of the feed for the cattle is grown on these soils. Land slippage is common where the Guernsey soils are used for pasture. This occurs when the upper part of the soil profile becomes fully saturated with water. Then a cleavage plane forms in the subsoil, about 15 to 30 inches below the surface, and land slippage results.

In a few places pits have been opened in this association, and limestone has been removed for agricultural use. Most of this lime has been used locally to improve the soils, but some has been sold.

8. Monongahela-Holston Association

Moderately well drained and well drained, deep soils on stream terraces

This association consists mainly of Monongahela and Holston soils on high terraces along Red Bank, Toby, and Mahoning Creeks and along other large streams in the county. The Monongahela soils are moderately well drained. They have a fragipan in the subsoil and generally require artificial drainage. In most places rounded stones and pebbles are scattered on the surface and throughout the profile. The substratum generally consists of low-grade gravel in nonuniform beds. The Holston soils, which normally adjoin the Monongahela soils, have good natural drainage and are free from mottling. They were formed in silty material and lack stones and pebbles on the surface and in the profile.

The Sequatchie soils occupy minor areas of this association. They are deep and well-drained soils, and they are in bands between the soils on high terraces and those on flood plains (fig. 5). Because they are on medium high terraces, they are flooded only in years of torrential rainfall. The Sequatchie soils are younger than the Monongahela and Holston soils, but they are older than the soils on the flood plains.

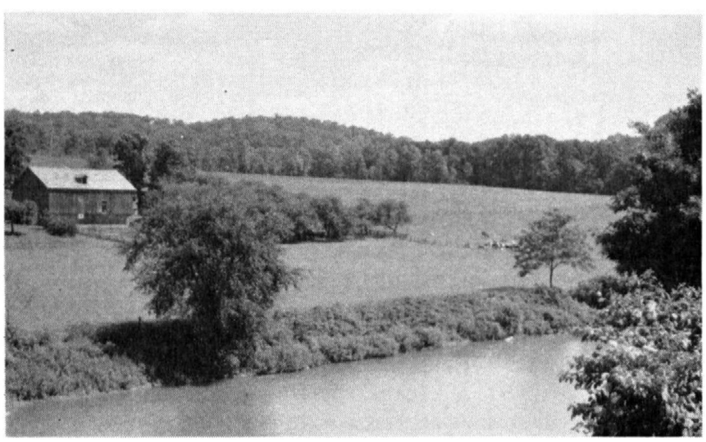

***Figure 5.*—Flooding seldom occurs on the gently sloping Sequatchie soils along Red Bank Creek in association 8. The higher, more sloping fields in the background consist of Monongahela soils.**

About half the acreage in this association is farmed, and the rest is in trees or is occupied by towns. Parts of the towns of Punxsutawney, Brockway, and Worthville are within this association. Along Toby Creek, near Brockway, several pits have been opened to obtain commercial gravel.

9. Purdy-Tyler-Zoar Association

Poorly drained to moderately well drained, fine-textured soils on stream terraces

The soils of this association are mainly on terraces along the older and larger streams, such as the Mahoning, Toby, and Sandy Lick Creeks. They are in areas where water ponded when floodwaters receded, and they are made up of fine silt and clay. The Purdy soils are poorly drained, the Tyler are somewhat poorly drained, and the Zoar are moderately well drained.

Minor soils of the association are those on flood plains—the well drained Pope, the moderately well drained Philo, and the poorly drained Atkins soils. These soils are proportionately more extensive in this association than in other associations.

Where the soils of this association are used for farming, they are generally in hay. Many areas are wooded or have a good growth of shrubs and other vegetation. Several towns, among them Sykesville and Brockway, are on the silty and clayey benches along streams within the association.

Use and Management of the Soils

This section of the report has several parts. It deals with the soils of the county in relation to various uses and methods of management.

In the first part, the system of capability classification used by the Soil Conservation Service is explained. Then the capability units, or groups of soils that have similar management, are discussed and suitable crops or other uses and the main needs for good management are described. The second part gives estimates of the productivity of the soils for various crops under two levels of management. In the third part, wildlife is discussed, and the suitability of various game species in relation to different soils is given. This is followed by a discussion of woodland in relation to the soils. Finally, the engineering properties of the soils are given, and some items of importance to home builders are described.

Capability Groups of Soils

The capability classification is a grouping of soils that shows, in a general way, how suitable the soils are for most kinds of farming. It is a practical grouping based on limitations of the soils, the risk of damage when they are used, and the way they respond to treatment.

In this system all the kinds of soil are grouped at three levels, the capability class, subclass, and unit. The eight capability classes in the broadest grouping are designated by Roman numerals I through VIII. In class I are the soils that have few limitations, the widest range of use, and the least risk of damage when they are used. The soils in the other classes have progressively greater natural limitations. In class VIII are soils and landforms so rough, shallow, or otherwise limited that they do not produce worthwhile yields of crops, forage, or wood products.

The subclasses indicate major kinds of limitations within the classes. Within most of the classes, there can be up to four subclasses. The subclass is indicated 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* means that water in or on the soil will interfere 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 country, indicates that the chief limitation is a climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few or no limitations. Class V can contain, at the most, only subclasses *w*, *s*, and *c*, because the soils in it have little or no susceptibility to erosion but have other limitations that confine their use largely to pasture, range, woodland, or wildlife. There are no soils of class V in this county.

Within the subclasses are the capability units, groups of soils enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally identified by numbers assigned locally, for example, IIe-1 or IIIe-2.

Soils are classified in capability classes, subclasses, and units in accordance with the degree and kind of their permanent limitations; but without consideration of major and generally expensive landforming that would change the slope, depth, or other characteristics of the soil; and without consideration of possible but unlikely major reclamation projects.

Seven of the eight classes in the capability system, and the subclasses and units in this county, are described in the list that follows.

Class I.—Soils that have few limitations that restrict their use.
- Unit I-1: Nearly level, deep, well-drained, medium-textured soils.
- Unit I-2: Nearly level, deep, well-drained, medium- to coarse-textured soils on flood plains.

Class II.—Soils that have some limitations that reduce the choice of plants or that require moderate conservation practices.
- Subclass IIe: Soils subject to moderate erosion if they are not protected.
  - Unit IIe-1: Gently sloping to moderately sloping, deep or moderately deep, well-drained soils.
  - Unit IIe-2: Gently sloping, moderately deep or deep, moderately well drained soils.
  - Unit IIe-3: Gently sloping, shallow to moderately deep, well-drained soils.
  - Unit IIe-4: Nearly level to gently sloping, well-drained, shallow to moderately deep, loamy soils.
- Subclass IIw: Soils that have moderate limitations because of excess water.
  - Unit IIw-1: Moderately deep and deep, moderately well drained or somewhat poorly drained soils that developed in acid and calcareous material of mixed origin.
  - Unit IIw-2: Deep, moderately well drained soil on flood plains.
- Subclass IIs: Soils that have moderate limitations of moisture capacity or tilth.
  - Unit IIs-1: Nearly level soils that developed in material weathered from acid shale and sandstone.

Class III.—Soils that have severe limitations that reduce the choice of plants, or that require special conservation practices, or both.
- Subclass IIIe: Soils subject to severe erosion if they are cultivated and not protected.
  - Unit IIIe-1: Gently to strongly sloping, deep and moderately deep, well-drained soils mainly on acid material.
  - Unit IIIe-2: Moderately sloping, moderately deep and deep, moderately well drained soils.
  - Unit IIIe-3: Strongly sloping, moderately deep to shallow, well-drained soils.
  - Unit IIIe-4: Strongly sloping, shallow to moderately deep, well-drained, loamy soils.
  - Unit IIIe-5: Moderately sloping, moderately deep and deep, somewhat poorly drained soils that have a subsoil of tight clay.
- Subclass IIIw: Soils that have severe limitations because of excess water.
  - Unit IIIw-1: Nearly level, moderately deep and deep, somewhat poorly drained soils that have a tight subsoil.
  - Unit IIIw-2: Nearly level, deep, poorly drained soil of flood plains.
  - Unit IIIw-3: Gently sloping, moderately deep or deep, somewhat poorly drained soils that have a tight subsoil.
- Subclass IIIs: Soils that have severe limitations of moisture capacity or tilth.
  - Unit IIIs-1: Nearly level and gently sloping, shallow, well-drained, shaly soils.

Class IV.—Soils that have very severe limitations that restrict the choice of plants, require very careful management, or both.
- Subclass IVe: Soils subject to very severe erosion if they are cultivated and not protected.
  - Unit IVe-1: Strongly sloping to moderately steep, dominantly deep, well-drained soils on acid material and other material low in lime.
  - Unit IVe-2: Moderately sloping to steep, moderately deep or deep, moderately well drained soils that have a clay subsoil and are moderately or severely eroded.
  - Unit IVe-3: Moderately steep, shallow to moderately deep, well-drained soils.
- Subclass IVw: Soils that have very severe limitations for cultivation, because of excess water.
  - Unit IVw-1: Nearly level or gently sloping, moderately deep or deep, somewhat poorly drained or poorly drained soils.

Unit IVw-2: Nearly level or gently sloping, deep, poorly drained or very poorly drained soils.

Class VI.—Soils that have severe limitations that make them generally unsuitable for cultivation and that limit their use largely to pasture or range, woodland, or wildlife food and cover.

Subclass VIe: Soils severely limited, chiefly by risk of erosion if protective cover is not maintained.

Unit VIe-1: Steep, moderately deep, well-drained soil that contains some limestone.

Unit VIe-2: Steep, shallow to moderately deep, well-drained soils consisting of shale material and some sandstone.

Unit VIe-3: Steep, shallow to moderately deep, well-drained, loamy soils.

Subclass VIs: Soils generally unsuitable for cultivation and limited for other uses by their moisture capacity, stones, or other features.

Unit VIs-1: Moderately well drained or well drained, very stony soils.

Unit VIs-2: Somewhat poorly drained, very stony soils.

Class VII.—Soils that have very severe limitations that make them unsuited to cultivation and that restrict their use largely to grazing, woodland, or wildlife.

Subclass VIIe: Soils very severely limited, chiefly by risk of erosion if protective cover is not maintained.

Unit VIIe-1: Steep, shallow to moderately deep, well-drained, loamy soil.

Unit VIIe-2: Steep or very steep, shallow, well-drained soils of shale material and some sandstone.

Subclass VIIs: Soils very severely limited by moisture capacity, stones, or other soil features.

Unit VIIs-1: Steep, very shallow, well-drained, shaly soil.

Unit VIIs-2: Shallow to deep, well-drained, very stony soils and spoil from strip mines.

Unit VIIs-3: Deep, poorly drained, nearly level to gently sloping, very stony soils.

Class VIII.—Soils and landforms that have limitations that preclude their use for commercial production of plants; and restrict their use to recreation, wildlife, water supply, or esthetic purposes.

Subclass VIIIs: Rock or soil materials that have little potential for production of vegetation.

Unit VIIIs-1: Very acid material consisting of huge piles of carbonaceous rocks and mine waste near entrances to deep mines.

Unit VIIIs-2: Severely gullied material near old, abandoned areas where coke ovens once operated.

Management by Capability Units

The soils in one capability unit have about the same limitations and similar risks of damage. All of the soils in one unit, therefore, need about the same kind of management, though they may have formed from different kinds of parent material and in different ways.

The capability units are described in the following pages. The soils in each unit are listed, and management suitable for all the soils in one unit is suggested. Further information concerning the management of soils can be obtained from a local representative of the Soil Conservation Service or from the county agricultural agent. Proper guidance can also be obtained on how to take and prepare soil samples from specific fields for tests to indicate the needs of lime and fertilizer for a particular crop.

Suitable crop rotations are described for each unit in terms of high, medium, or low intensity. The intensity of the rotations is defined as follows:

High-intensity (2-year) rotation: 1 year of a row crop followed by a cover crop in winter, and then 1 year of a small grain followed by a green-manure crop or its equivalent.

Medium-intensity (3-year) rotation: 1 year of a row crop followed by a cover crop in winter, and then 1 year of a small grain followed by 1 year of a hay crop or its equivalent.

Low-intensity (4- or 5-year) rotation: 1 year of a row crop followed by a cover crop in winter, then 1 year of a small grain, and, finally 2 to 3 years of hay or its equivalent.

Capability unit I-1

This capability unit consists of deep, well-drained soils of medium texture. These soils are nearly level and have had little or no erosion. They formed in material weathered from acid shale and sandstone. They are moderately permeable to water and air, have high water-holding capacity, and are moderately high in productivity. The following soils are in this unit:

Hartsells loam, 0 to 5 percent slopes.
Holston silt loam, 0 to 5 percent slopes.
Sequatchie silt loam, 0 to 5 percent slopes.
Wellston silt loam, 0 to 5 percent slopes.

These soils are well suited to corn, alfalfa, and other deep-rooted crops. Contour farming is needed to control erosion on the long slopes. The content of organic matter can be kept high and the structure of the soil can be maintained even if a rotation of high intensity is used. Crop residues need to be turned under and a cover crop ought to be grown. Lime should be applied according to the results of soil tests and the needs of the crop.

Capability unit I-2

Deep, well-drained, medium- to coarse-textured soils make up this capability unit. They are nearly level and have had little or no erosion. The soils were formed in material weathered from sandstone and shale. They have moderately rapid permeability, have high water-holding capacity, and are highly productive. They are subject to occasional flooding. The following soils are in this unit:

Pope fine sandy loam.
Pope silt loam.

These soils are suited to corn, alfalfa, and other deep-rooted crops. The content of organic matter can be kept high and the structure of the soils can be maintained by using a rotation of high intensity in which cover crops are grown. Lime and fertilizer should be applied according to the results of soil tests and the needs of the crop. A cover crop seeded in a row crop, or following it, offers protection from scouring during floods.

711-148—64——2

Capability unit IIe-1

This capability unit is made up of deep or moderately deep, well-drained, medium-textured soils. These soils are gently sloping to moderately sloping and are slightly to moderately eroded. They were developed in material weathered from acid sandstone and shale and from sandstone and shale that are low in lime. These soils are moderately permeable to air and water, and they are moderately productive. All of the soils except the Westmoreland have high water-holding capacity. The following soils are in this unit:

Hartsells loam, 5 to 12 percent slopes.
Hartsells loam, 5 to 12 percent slopes, moderately eroded.
Holston silt loam, 5 to 12 percent slopes.
Shelocta silt loam, 3 to 8 percent slopes, moderately eroded.
Wellston silt loam, 5 to 12 percent slopes, moderately eroded.
Westmoreland silt loam, 5 to 12 percent slopes, moderately eroded.

These soils are well suited to corn, alfalfa, and other deep-rooted crops. The content of organic matter and the structure of the soils can be maintained if a rotation of medium intensity is used and if the proper kinds and amounts of fertilizer are added. Cover crops need to be grown and crop residues should be returned to the soils. Lime ought to be applied according to the results of soil tests and the needs of the crop. Contour stripcropping and diversion terraces are necessary on some of the long slopes to reduce the loss of water and to control erosion.

Capability unit IIe-2

The soils of this capability unit are moderately deep or deep, mainly moderately well drained, and medium textured. They are gently sloping and are slightly to moderately eroded. Most of these soils were formed in material weathered from acid sandstone and shale, but the Guernsey soil was formed in material that contains some lime. The soils of this unit are moderate to high in water-holding capacity and are moderately productive. Their subsoil is slowly permeable. The following soils are in this unit:

Cookport channery loam, 3 to 8 percent slopes.
Cookport channery loam, 3 to 8 percent slopes, moderately eroded.
Cookport loam, 3 to 8 percent slopes.
Cookport loam, 3 to 8 percent slopes, moderately eroded.
Ernest silt loam, 3 to 8 percent slopes.
Ernest silt loam, 3 to 8 percent slopes, moderately eroded.
Guernsey silty clay loam, 3 to 8 percent slopes, moderately eroded.
Monongahela silt loam, 3 to 8 percent slopes.
Wharton silt loam, 3 to 8 percent slopes.
Wharton silt loam, 3 to 8 percent slopes, moderately eroded.

These soils are moderately well suited to such crops as corn and alfalfa. The content of organic matter and the structure of the soils can be maintained if a rotation of medium intensity is used and if fertilizer is applied properly. Cover crops are also needed, and the residues from row crops need to be turned under. Lime ought to be applied according to the results of soil tests and the needs of the crop. Graded stripcropping and diversion terraces are needed in some places to provide surface drainage and to control erosion. Seep areas can be drained by means of random tile.

Capability unit IIe-3

In this capability unit are shallow to moderately deep, well-drained, medium-textured soils. These soils are gently sloping and slightly to moderately eroded. They formed in material from deeply weathered, acid siltstone, sandstone, and shale. These soils are moderately to rapidly permeable and hold a moderate amount of moisture available for plants to use. They are moderately productive. The following soils are in this unit:

Gilpin channery silt loam, 5 to 12 percent slopes.
Gilpin channery silt loam, 5 to 12 percent slopes, moderately eroded.
Gilpin silt loam, 5 to 12 percent slopes.
Gilpin silt loam, 5 to 12 percent slopes, moderately eroded.

The soils of this unit are suited to such deep-rooted crops as alfalfa, and they are moderately well suited to corn. Under proper management, a stand of alfalfa can be maintained for several years. The content of organic matter and the soil structure can be maintained if the soils are properly fertilized, if a crop rotation of medium intensity is used, if cover crops are grown, and if the residues from row crops are turned under. Lime ought to be applied according to the results of soil tests and the needs of the crop. Contour stripcropping and diversion terraces are necessary to reduce runoff and to control erosion.

Capability unit IIe-4

This capability unit consists of shallow to moderately deep, well-drained, medium-textured soils. These soils are nearly level to gently sloping and are slightly to moderately eroded. They developed in material weathered from acid sandstone and shale. The soils are moderately to rapidly permeable and have a low capacity for holding water that plants can use. They are low in productivity. The following soils are in this unit:

Dekalb channery loam, 0 to 5 percent slopes.
Dekalb channery loam, 5 to 12 percent slopes.
Dekalb channery loam, 5 to 12 percent slopes, moderately eroded.
Dekalb loam, 0 to 5 percent slopes.
Dekalb loam, 5 to 12 percent slopes.
Dekalb loam, 5 to 12 percent slopes, moderately eroded.

The soils of this unit are moderately well suited to all of the farm crops commonly grown in the county. Alfalfa, however, grows poorly unless good management is used. The structure of the soils and the content of organic matter can be maintained if the soils are properly fertilized, if a medium-intensity crop rotation is used, if cover crops are grown, and if crop residues are returned to the soils. Lime ought to be applied according to the results of soil tests and the needs of the crop. Contour stripcropping and diversion terraces are needed in some places to reduce runoff and to control erosion.

Capability unit IIw-1

Nearly level, moderately deep and deep, moderately well drained or somewhat poorly drained soils of medium texture make up this capability unit. These soils have not been changed much by erosion and are moderately slow in permeability. They were developed in acid and calcareous material of mixed origin. They have moderate to high water-holding capacity and are moderately productive. The following soils are in this unit:

Cookport channery loam, 0 to 3 percent slopes.
Cookport loam, 0 to 3 percent slopes.
Ernest silt loam, 0 to 3 percent slopes.
Guernsey silty clay loam, 0 to 3 percent slopes.
Monongahela silt loam, 0 to 3 percent slopes.
Wharton silt loam, 0 to 3 percent slopes.
Zoar silt loam, 0 to 3 percent slopes.

These soils are moderately well suited to all of the farm crops commonly grown in the county. The content of organic matter and the structure of the soils can be maintained if a rotation of medium intensity is used, if cover crops are grown, and if crop residues are returned to the soils. Lime and fertilizer should be applied according to the results of soil tests and the needs of the crop. Diversion terraces are needed in some places to remove excess water. Shallow surface drains and tile are needed in some places to drain wet spots.

Capability unit IIw–2

The only soil in this unit is Philo silt loam. It is nearly level, deep, moderately well drained, and medium textured. It was formed in acid alluvium and is moderately productive. This soil has high water-holding capacity and a moderately to rapidly permeable subsoil. It is subject to flooding, but crops are damaged only occasionally.

This soil is suited to hay, corn, oats, grass grown for pasture, and other similar crops. The structure of the soil and the content of organic matter can be maintained if a crop rotation of medium intensity is used and if cover crops are grown. Lime and fertilizer ought to be applied according to the results of soil tests. A cover crop grown in a row crop or following the row crop offers protection from scouring during periods of flooding.

Capability unit IIs–1

This capability unit consists of nearly level, shallow to moderately deep, well-drained, medium-textured soils that are slightly eroded. These soils were formed in material weathered from acid shale and sandstone. They have moderate to rapid permeability, have moderate water-holding capacity, and are moderately productive. The following soils are in this unit:

Gilpin channery silt loam, 0 to 5 percent slopes.
Gilpin silt loam, 0 to 5 percent slopes.

These soils are suited to deep-rooted crops, such as alfalfa, and they are moderately well suited to corn. With proper management, the stand of alfalfa is often maintained for many years. Using a medium-intensity crop rotation, growing cover crops, and returning crop residues to the soils are practices that are needed to maintain the content of organic matter and to improve the structure of the soils. Lime and fertilizer ought to be applied according to the results of soil tests and the needs of the crop. Diversion terraces and contour farming may be needed to help control erosion.

Capability unit IIIe–1

In this capability unit are gently to strongly sloping, deep and moderately deep, well-drained, medium and moderately fine textured soils that are slightly to moderately eroded. These soils were formed in material weathered mainly from acid shale and sandstone and from shale and sandstone that are low in lime. They have moderate permeability and moderate to high water-holding capacity. They are moderately productive. The reddish Upshur soil in the Gilpin-Upshur complex is more clayey and plastic, and therefore more difficult to till, than the other soils in this capability unit. The following soils are in this unit:

Gilpin-Upshur silty clay loams, 3 to 8 percent slopes, moderately eroded.
Hartsells loam, 12 to 20 percent slopes, moderately eroded.
Holston silt loam, 12 to 20 percent slopes, moderately eroded.
Wellston silt loam, 12 to 20 percent slopes, moderately eroded.
Westmoreland silt loam, 12 to 20 percent slopes, moderately eroded.

These soils are suited to such crops as alfalfa and corn. With proper management, the stand of alfalfa is often maintained for many years. Adding the proper kinds and amounts of fertilizer, using a rotation of low intensity, growing cover crops, and returning crop residues to the soils help to maintain the content of organic matter and the structure of the soils. Lime should be applied according to the results of soil tests and the needs of the crop. Diversion terraces and stripcropping may be needed to help control erosion.

Capability unit IIIe–2

In this capability unit are moderately sloping, moderately deep and deep, moderately well drained, medium-textured soils. These soils are slightly to moderately eroded and are moderately slow in permeability. They have moderate to high water-holding capacity. They were formed in material weathered from acid siltstone, shale, and sandstone and are moderately productive. The following soils are in this unit:

Cookport channery loam, 8 to 15 percent slopes.
Ernest silt loam, 8 to 15 percent slopes.
Ernest silt loam, 8 to 15 percent slopes, moderately eroded.
Wharton silt loam, 8 to 15 percent slopes, moderately eroded.

These soils are moderately well suited to such crops as alfalfa and corn. The content of organic matter and the soil structure can be maintained if the soils are properly fertilized, if a low-intensity crop rotation is used, if cover crops are grown, and if the residues from row crops are turned under. Lime should be applied according to the results of soil tests and the needs of the crop. Graded strips and diversion terraces are necessary in some places to provide surface drainage and to control erosion. Seep spots can normally be drained by random tile.

Capability unit IIIe–3

The soils in this unit are moderately deep to shallow, well drained, and medium textured. They are strongly sloping and are slightly to moderately eroded. These soils were formed in material weathered from acid shale, siltstone, and sandstone. The permeability of the subsoil is moderate to rapid, and the water-holding capacity is moderate. The soils are moderately productive. The following soils are in this unit:

Gilpin channery silt loam, 12 to 20 percent slopes.
Gilpin channery silt loam, 12 to 20 percent slopes, moderately eroded.
Gilpin silt loam, 12 to 20 percent slopes.
Gilpin silt loam, 12 to 20 percent slopes, moderately eroded.

These soils are suited to alfalfa and other deep-rooted crops, and they are moderately well suited to corn. With proper management, the stand of alfalfa is often maintained for many years. The content of organic matter and the soil structure can be maintained if the soils are properly fertilized, if a crop rotation of low intensity is used, if cover crops are grown, and if crop residues are returned to the soils. Lime should be applied according to the results of soil tests and the needs of the crop. Contour stripcropping and diversion terraces are necessary in some places to reduce runoff and to control erosion.

Capability unit IIIe-4

This capability unit consists of strongly sloping, shallow to moderately deep, well-drained, medium-textured soils that are slightly to moderately eroded. These soils were formed in material weathered from acid sandstone and shale. They are moderate to rapid in permeability, low in water-holding capacity, and low in productivity. The following soils are in this unit:

- Dekalb channery loam, 12 to 20 percent slopes.
- Dekalb channery loam, 12 to 20 percent slopes, moderately eroded.
- Dekalb loam, 12 to 20 percent slopes.
- Dekalb loam, 12 to 20 percent slopes, moderately eroded.

The soils of this unit are moderately well suited to all of the farm crops grown in the area. Alfalfa, however, grows poorly. Using a low-intensity crop rotation, growing cover crops, and returning crop residues to the soils help to maintain the structure of the soils and the content of organic matter. Lime and fertilizer ought to be applied according to the results of soil tests and the needs of the crop. Contour stripcropping and diversion terraces are needed in some places to reduce runoff and to control erosion.

Capability unit IIIe-5

In this capability unit are moderately sloping, moderately deep and deep, somewhat poorly drained, medium-textured soils that are slightly to moderately eroded. These soils were formed in material weathered from acid clay shale, and they have a subsoil of tight clay. They are slowly permeable, have moderate water-holding capacity, and are low to moderate in productivity. The following soils are in this unit:

- Cavode silt loam, 8 to 15 percent slopes.
- Cavode silt loam, 8 to 15 percent slopes, moderately eroded.

These soils are moderately well suited to such crops as corn, birdsfoot trefoil, clover, and grass. Such crops as alfalfa and winter grains are usually winterkilled by frost heaving, and yields are drastically reduced. Spring grains are difficult to sow early because the soil dries out late in spring. The content of organic matter and the structure of the soils can be maintained by using a crop rotation of low intensity, by growing cover crops, and by returning crop residues to the soils. Applications of lime and fertilizer ought to be made according to the results of soil tests and the needs of the crop. Graded stripcropping and diversion terraces are needed in places to provide surface drainage and to control erosion. Seep spots can be drained by random tile.

Capability unit IIIw-1

This capability unit is made up of nearly level, moderately deep and deep, somewhat poorly drained, medium-textured soils that have had little or no erosion. These soils were formed in acid material of mixed origin. They have a tight subsoil that is slowly permeable. The water-holding capacity is moderate to high. The soils are low to moderate in productivity. The following soils are in this unit:

- Cavode silt loam, 0 to 3 percent slopes.
- Tyler silt loam.

These soils are moderately well suited to corn, birdsfoot trefoil, clover, and grass. Such crops as alfalfa and winter grains are usually winterkilled by frost heaving, and yields are drastically reduced. Spring grains cannot be sown early enough to obtain good yields. The content of organic matter and the structure of the soils can be maintained if the soils are properly fertilized, if a low-intensity crop rotation is used, if cover crops are grown, and if crop residues are turned under. Lime needs to be applied according to the results of soil tests and the needs of the crop. Graded stripcropping and diversion terraces are necessary in places to provide surface drainage. Most seep areas can be drained with random tile.

Capability unit IIIw-2

The only soil in this capability unit is Atkins silt loam. It is deep, nearly level, poorly drained, and medium textured. This soil is along streams. It is not subject to erosion but is subject to flooding. It was formed in acid alluvium. Damage to crops is slight or moderate in most areas, because most flooding occurs in winter and spring and is of only short duration. This soil is slowly to moderately permeable and has high water-holding capacity.

This soil is suited to shallow-rooted crops that tolerate wetness. Corn, birdsfoot trefoil, and mixed hay crops produce moderately well if the wetness is reduced. Small grains produce poorly, and alfalfa is not suitable. The structure of the soil and the content of organic matter can be maintained by using a crop rotation of low intensity and by adding the proper kinds and amounts of fertilizer. Lime should be applied according to the results of soil tests and the needs of the crop. Open drains and random closed drains help to provide surface drainage. Improving the channel of the stream lessens the frequency of flooding.

Capability unit IIIw-3

The soils in this capability unit are moderately deep or deep, somewhat poorly drained, and medium textured. They are gently sloping and slightly to moderately eroded, and they have a tight subsoil. These soils were formed on acid clay shale and siltstone. They have slow permeability and moderate water-holding capacity. The following soils are in this unit:

- Cavode silt loam, 3 to 8 percent slopes.
- Cavode silt loam, 3 to 8 percent slopes, moderately eroded.

These soils are moderately well suited to corn, birdsfoot trefoil, clover, and grass (fig. 6). Alfalfa and winter grains are subject to winterkill by frost heaving. Because the soils remain wet until late in spring, it is often difficult to sow spring grains. The content of organic matter and the structure of the soils can be maintained by using a crop rotation of low intensity, by growing cover crops, and by returning crop residues to the soils. Lime and fertilizer ought to be applied according to the results of soil tests and the needs of the crop. Conservation practices may include graded stripcropping and diversion terraces, which provide surface drainage and help to control erosion. Seep areas can be eliminated by installing random systems of tile underdrains.

Figure 6.—**Pasture grasses grow well on the Cavode soils in capability unit IIIw-3. In the background is a Gilpin silt loam.**

Capability unit IIIs-1

This capability unit consists of nearly level and gently sloping, shallow, shaly, well-drained, medium-textured soils that are slightly to moderately eroded. These soils were formed on acid shale and siltstone. They have rapid permeability, are very low in water-holding capacity, and are low in productivity. The following soils are in this unit:

Montevallo-Gilpin shaly silt loams, 0 to 5 percent slopes.
Montevallo-Gilpin shaly silt loams, 5 to 12 percent slopes, moderately eroded.

These soils are suited to small grains and hay crops. They are too droughty for growing corn. The content of organic matter and the structure of the soils can be maintained by adding the proper kinds and amounts of fertilizer, by using a crop rotation of low intensity, by growing cover crops, and by returning crop residues to the soils. Lime needs to be applied according to the results of soil tests and the needs of the crop. Contour stripcropping helps reduce erosion. Diversion terraces are used to help reduce runoff and to control erosion where the soil material is deep enough to allow terraces to be constructed.

Capability unit IVe-1

Only one mapping unit, Gilpin-Upshur silty clay loams, 8 to 25 percent slopes, moderately eroded, is in this capability unit. It consists of Gilpin and Upshur soils that occur in an intricate pattern. The soils are strongly sloping to moderately steep, and they are well drained. They formed in acid material and in other material that is low in lime.

The soils are extremely variable within short distances; the range is from the typical Gilpin soil to the typical Upshur. Areas of the Gilpin soil are moderately deep to shallow, medium textured, well drained, and generally acid. Areas of the Upshur soil are reddish and deep. The Upshur soils have a more clayey and plastic subsoil and tend to be less acid than the Gilpin soils. There is some mixing, and the properties of one soil influence the properties of the other. Because of the complex pattern of the two soils, it is more practical to use and manage them as a unit. The Upshur soil is generally more difficult to plow and disk than the Gilpin because its surface layer is sticky when wet and hard when dry.

Because the soils of the Gilpin-Upshur complex are steep and erodible, they are better suited to hay than to row crops. Alfalfa and birdsfoot trefoil grow well on them. The content of organic matter and the structure of the soils can be maintained by growing long-term hay with an occasional row crop or small grain and by adding the proper kinds and amounts of fertilizer. If row crops are grown, the crop residues should be returned to the soils or cover crops should be planted to provide protection in winter. Lime ought to be applied according to the results of soil tests and the needs of the crop. Using diversion terraces where the soil material is deep enough and the slope is suitable and reseeding hay in contour strips of small grain help to control erosion.

Capability unit IVe-2

This capability unit consists of moderately sloping to steep, moderately deep or deep, moderately well drained, medium-textured soils that have a clay subsoil and are moderately or severely eroded. These soils were formed in material weathered from acid siltstone, shale, and sandstone. They have moderate water-holding capacity, slow permeability, and moderate productivity. The following soils are in this unit:

Cavode silty clay loam, 8 to 15 percent slopes, severely eroded.
Cavode silt loam, 15 to 25 percent slopes, moderately eroded.
Ernest silt loam, 8 to 15 percent slopes, severely eroded.

These soils are suited to shallow-rooted crops, such as birdsfoot trefoil and timothy. They have limited suitability for such crops as alfalfa and corn. The content of organic matter and the structure of the soils can be maintained by using these soils for long-term hay with an occasional row crop or small grain, and by fertilizing properly. When row crops are grown to reestablish hay, the residues should be returned to the soils or cover crops should be planted to provide protection in winter. Lime ought to be applied according to the results of soil tests and the needs of the crop. Graded strips and diversion terraces on suitable slopes are needed in some places to provide surface drainage and to control erosion. In most places seep spots can be drained with random tile.

Capability unit IVe-3

This capability unit consists of moderately steep, shallow to moderately deep, well-drained, medium-textured soils that are moderately to severely eroded. These soils were formed on acid shale, siltstone, and sandstone. Their subsoil is moderately to rapidly permeable, and the water-holding capacity is low. The soils are moderately productive. The following soils are in this unit:

Gilpin channery silt loam, 12 to 20 percent slopes, severely eroded.
Montevallo-Gilpin shaly silt loams, 12 to 20 percent slopes, moderately eroded.

These soils are suited to small grains and to crops grown for hay. They are generally too droughty for corn. The content of organic matter and the structure of the soils can best be maintained by keeping these soils under a permanent cover, except when renovating the grass or legume mixture by seeding it in a crop of small grain.

Lime and fertilizer ought to be applied according to the results of soil tests and the needs of the crop. Contour stripcropping and diversion terraces are necessary to reduce runoff and to control erosion. In some areas the soil material may not be deep enough for building diversion terraces.

Capability unit IVw-1

This capability unit consists of nearly level or gently sloping, moderately deep or deep, somewhat poorly drained or poorly drained, medium-textured soils that have had little or no erosion. These soils were formed in acid material of mixed origin. Their subsoil is slowly to very slowly permeable, and their water-holding capacity is moderate to high. The following soils are in this unit:

- Brinkerton and Armagh silt loams, 0 to 3 percent slopes.
- Brinkerton and Armagh silt loams, 3 to 8 percent slopes.
- Nolo silt loam, 0 to 3 percent slopes.
- Nolo silt loam, 3 to 8 percent slopes.

These soils are not suited to row crops or small grains. They are better suited to shallow-rooted crops grown for hay, such as birdsfoot trefoil, clover, and grass. Alfalfa and other deep-rooted crops grow very poorly. The content of organic matter and the soil structure can be maintained if the soils are properly fertilized and if a rotation is used in which long-term hay is grown. Lime should be applied according to the results of soil tests and the needs of the crop. Open drains, graded strips, and diversion terraces are needed in places to provide surface drainage. Random closed drains can be used for subsurface drainage.

Capability unit IVw-2

In this capability unit are nearly level or gently sloping, deep, poorly drained or very poorly drained, medium-textured soils that are not eroded. These soils were formed in acid material of mixed origin. They have slow or very slow permeability and high water-holding capacity. The following soils are in this unit:

- Brinkerton silt loam, very wet, 0 to 3 percent slopes.
- Brinkerton silt loam, very wet, 3 to 8 percent slopes.
- Purdy silt loam.

These soils are poorly suited to row crops or small grains. They are better suited to hay and pasture grasses and legumes that tolerate wetness. Lime ought to be applied according to the results of soil tests and the needs of the crop. Open drains, random closed drains, and bedding remove runoff and help to improve growing conditions.

Capability unit VIe-1

The only soil in this capability unit is Westmoreland silt loam, 20 to 35 percent slopes, moderately eroded. This soil is moderately deep, well drained, and medium textured. It was formed mainly in acid material but partly in material that contains some lime. It has a moderately permeable subsoil, moderate water-holding capacity, and moderate productivity.

This soil is well suited to perennial legumes and grasses, such as alfalfa, birdsfoot trefoil, smooth bromegrass, and orchardgrass. Pasture and long-term hay are good uses. Lime and fertilizer ought to be applied according to the results of soil tests and the needs of the crop. Reseeding should be done in contour strips to reduce runoff and erosion.

Capability unit VIe-2

This capability unit consists of steep, shallow to moderately deep, well-drained, medium-textured soils that are slightly to moderately eroded. These soils were formed in material weathered from acid shale and some sandstone. They are moderately permeable and are moderately productive if they are well managed. They are low to moderate in water-holding capacity. The following soils are in this unit:

- Gilpin channery silt loam, 20 to 35 percent slopes.
- Gilpin channery silt loam, 20 to 35 percent slopes, moderately eroded.
- Gilpin silt loam, 20 to 35 percent slopes.
- Gilpin silt loam, 20 to 35 percent slopes, moderately eroded.

These soils are well suited to pasture. Because of their steep slopes and the risk of erosion, they are not well suited to more intensive use. Reseeding of pasture should be done in small grains and in contour strips. Birdsfoot trefoil generally does well on these soils. Lime should be applied according to the results of soil tests and the needs of the crop. Diversion terraces may be needed, where slopes are suitable, to control runoff and to protect the soils from erosion.

Capability unit VIe-3

In this capability unit are steep, shallow to moderately deep, well-drained, medium-textured soils that are slightly to moderately eroded. These soils formed in material weathered from acid shale and sandstone. They are moderately permeable, low in water-holding capacity, and low in natural fertility. The following soils are in this unit:

- Dekalb channery loam, 20 to 35 percent slopes.
- Dekalb channery loam, 20 to 35 percent slopes, moderately eroded.

Because these soils are steep and erodible, they are best suited to pasture or trees. If they are used for pasture, grasses and legumes that resist drought should be seeded. Lime and fertilizer should be applied according to the results of soil tests. Diversion terraces remove runoff caused by heavy rains, and they help to control erosion. They can be used on suitable slopes.

Capability unit VIs-1

This capability unit consists of gently to strongly sloping, moderately deep and deep, moderately well drained or well drained, very stony soils that are light to medium in texture. These soils were developed in material weathered from acid sandstone and shale. They have had little or no erosion, but they are moderately low in plant nutrients. Their subsoil is moderately permeable. The Dekalb soils are low in water-holding capacity. The rest of the soils in this unit are moderate to high in water-holding capacity. The following soils are in this unit:

- Cookport very stony loam, 0 to 8 percent slopes.
- Cookport very stony loam, 8 to 15 percent slopes.
- Dekalb very stony loam, 0 to 12 percent slopes.
- Dekalb very stony loam, 12 to 35 percent slopes.
- Ernest very stony silt loam, 0 to 8 percent slopes.
- Ernest very stony silt loam, 8 to 25 percent slopes.
- Gilpin very stony silt loam, 0 to 12 percent slopes.
- Gilpin very stony silt loam, 12 to 35 percent slopes.

These soils are too stony for cultivation. They make moderately good pasture if they are limed and fertilized according to the results of soil tests. Removing stones from the surface makes it easier to improve the pastures.

Capability unit VIs–2

In this capability unit are gently to strongly sloping, moderately deep or deep, somewhat poorly drained, very stony soils of medium texture. These soils have had little or no erosion. They formed in material weathered from acid shale and sandstone. They have a slowly permeable subsoil, and they are moderately low in plant nutrients. The water-holding capacity is moderate. The following soils are in this unit:

Cavode very stony silt loam, 0 to 8 percent slopes.
Cavode very stony silt loam, 8 to 25 percent slopes.

These soils are too stony for cultivation and are better suited to pasture or trees. If the soils are used for pasture, grasses that tolerate wetness should be planted. Lime and fertilizer ought to be applied according to the results of soil tests. Grazing should be delayed in spring until the soils have dried enough to reduce danger of compacting. Trees that tolerate wetness should be used in reforestation.

Capability unit VIIe–1

The only soil in this capability unit is Dekalb channery loam, 35 to 60 percent slopes. It is shallow to moderately deep, well drained, and medium textured. This soil formed in material weathered from acid sandstone and shale. It is rapid in permeability, low in water-holding capacity, and low in natural fertility.

Because of the variations in its depth, this soil ranges from fair to poor for timber. On the lower part of long slopes, the profile is deeper than on the upper part of the slopes. Trees grow better on the lower part of the slopes and are of better quality. Trees adapted to dry sites should be used in reforestation. A protective cover of trees minimizes erosion.

Capability unit VIIe–2

In this capability unit are steep or very steep, shallow, well-drained, medium-textured soils that are slightly to severely eroded. These soils were formed in material weathered from acid shale and some sandstone. They have rapid permeability, moderate to low water-holding capacity, and low natural fertility. The following soils are in this unit:

Gilpin and Montevallo soils, 20 to 35 percent slopes, severely eroded.
Gilpin and Montevallo soils, 35 to 60 percent slopes.
Gilpin and Montevallo soils, 35 to 60 percent slopes, severely eroded.

Because of the hazard of erosion, these soils are not suited to grain crops or hay. They are difficult to manage for pasture. The timber potential is low, but an occasional forest harvest may be made. These soils need the protective cover of trees.

Capability unit VIIs–1

The only soil in this capability unit is Montevallo shaly silt loam, 20 to 35 percent slopes, moderately eroded. It is very shallow, well drained, and medium textured. This soil formed in material weathered from acid shale and sandstone. It has a rapidly permeable subsoil, and it is low in water-holding capacity and in natural fertility.

This soil is too shallow and steep for cultivated crops, but with proper management, plants that provide fair pasture can be grown. Care should be used not to overgraze the pastures. This erodible soil needs the protection of grass or trees.

Capability unit VIIs–2

This capability unit consists of gently sloping to very steep, shallow to deep, well-drained, medium- to coarse-textured, very stony soils and of spoil from strip mines. These soils were formed in material weathered from acid sandstone, shale, and quartzite. They are moderately to rapidly permeable, moderate to low in water-holding capacity, and moderate to low in plant nutrients. The land type, Strip mines, is extremely acid and is poorly suited to most plants. The following soils are in this unit:

Dekalb very stony loam, 35 to 100 percent slopes.
Gilpin very stony silt loam, 35 to 60 percent slopes.
Leetonia very stony sandy loam, 0 to 12 percent slopes.
Leetonia very stony sandy loam, 12 to 35 percent slopes.
Leetonia very stony sandy loam, 35 to 80 percent slopes.
Strip mines.

These soils are too stony for cultivation, and they are difficult to manage as pasture. Under proper management, they generally produce good stands of timber and pulpwood, especially in areas that are not too steep and stony. Small, odd areas on farms can be planted to shrubs or trees. These generally provide additional income, help to control erosion, and provide excellent shelter for wildlife. The woodland should be protected from fire and grazing.

Capability unit VIIs–3

This capability unit consists of nearly level to gently sloping, deep, poorly drained, medium-textured, very stony soils that have had little or no erosion. These soils were formed in material weathered from acid sandstone and shale. Their subsoil is slowly permeable. The soils are moderate in water-holding capacity and low in natural fertility. The following soils are in this unit:

Brinkerton and Armagh very stony silt loams, 0 to 8 percent slopes.
Nolo very stony silt loam, 0 to 8 percent slopes.

These soils are too stony for cultivation or for thorough subsurface drainage. Pasture grasses that tolerate wetness grow well, but the pastures are difficult to improve and manage. If these soils are used for pasture, lime and fertilizer ought to be applied according to the results of soil tests. Grazing should be delayed early in spring until the soils are no longer subject to compaction by trampling. Trees that tolerate wetness can be used for reforestation.

Capability unit VIIIs–1

This capability unit consists of Mine dumps, at the mouths of deep mines. The material is composed of waste coal, rocks, and carbonaceous shale piled in large, steep-sided mounds. This material is generally very acid and does not support normal vegetation. Where it has been leached enough to permit the growth of vegetation, trees, shrubs, vines, and grasses can be established to cover and stabilize the mounds.

Capability unit VIIIs–2

This capability unit consists of severely eroded and extremely gullied areas that have resulted from the operations of coke ovens. Escaping toxic gases from the ovens destroyed the surrounding vegetation and rendered the soil material temporarily sterile. Thus, bare areas were exposed to the weather for many years, and accelerated erosion formed large gullies. At present, sparse vegetation, consisting of aspen, birch, huckleberries, and other low-quality plants, grows voluntarily. The following land types are in this unit:

Gullied land, 3 to 12 percent slopes.
Gullied land, 12 to 35 percent slopes.

These land types are not economically suited to cultivation, pasture, or forest. They may be of some value for wildlife. Heavy applications of lime and fertilizer will help restore the vegetation, but this is generally not economical. Eventually, through leaching and the progression of plants, these areas will support higher forms of vegetation.

Productivity Ratings

The productivity of the soils of Jefferson County varies considerably. On some soils high yields of cultivated crops can be expected, but on others yields are only moderate or low. Table 1 shows estimated productivity ratings for representative crops grown in the county.

Each productivity rating denotes comparative yields of the soil for a particular crop in relation to a standard index of 100. The standard index represents the average acre yield obtained on the most productive soils of the county under average management. The acre yield represented by the standard index is given at the head of the column for each crop. The average yield figures are based on yields of the crops named during the years when the soil survey was being made.

The productivity ratings are given for two levels of management. In columns A are ratings to be expected under the normal, or prevailing, management. These ratings were based on records of yields obtained under management presently practiced by most of the farmers. In columns B are ratings to indicate yields that may be obtained in a favorable season when improved management is practiced. Improved management includes the application of enough lime, manure, and commercial fertilizer; the proper use of cropping systems and crop residues; drainage and irrigation systems where needed; the control of runoff, erosion, weeds, brush, insects, and plant diseases; proper preparation of the seedbed; and selection of suitable crops and varieties.

An index of 50 indicates that the soil is only about half as productive for the specified crop as a soil that has a standard index of 100. By using intensive management or by fertilizing heavily, an index of more than 100 can be obtained for some soils. Hartsells loam, 0 to 5 percent slopes, for example, has a rating of 100 for all the crops listed. Consequently, under the prevailing level of management (columns A), one can expect to obtain average yields per acre of 60 bushels of corn grown for grain, 50 bushels of oats, 30 bushels of wheat, 2 tons of an alfalfa-grass mixture, 1.5 tons of mixed hay, and 1.75 tons of a birdsfoot trefoil-grass mixture. Under improved management (columns B), the same soil has a productivity rating of 150 for corn grown for grain, 130 for oats, 130 for wheat, 160 for alfalfa-grass, 150 for mixed hay, and 150 for birdsfoot trefoil-grass. This means that yields per acre under improved management would equal 90 bushels of corn grown for grain, 65 bushels for oats, 39 bushels for wheat, 3.2 tons of alfalfa-grass, 2.25 tons of mixed hay, and 2.6 tons of birdsfoot trefoil and grass grown as a mixture.

Suitability of the Soils for Wildlife

In this section the suitability of the soils in the county as habitats for wildlife is discussed. The principal species of game in the county are cottontail rabbit, gray squirrel, white-tailed deer, bear, wild turkey, and ruffed grouse. There are also many kinds of songbirds and other birds that eat insects. In addition, small animals and other nongame species frequent the area. These have great value for the pleasure they give to persons who live in the county, and they have significant biological functions that make them important. Furthermore, they eat large quantities of undesirable insects and pests that destroy farm crops.

The occurrence and abundance of some kinds of wildlife are related to the kinds of soils. Many of the relationships are indirect and are influenced primarily by land use, the kinds of plants, and relief. On the fertile soils wildlife is generally more abundant, the individual animals tend to be larger, and the rate of production is higher than on soils of poor quality. On some farms the wildlife population has been reduced because the food supplies and protective cover were destroyed. If there is a suitable cover of plants, wildlife can be encouraged to live in an area, and the vegetation will also help protect the soils.

Among the areas that are suitable for wildlife are farms, woodland, parks, wildlife refuges, private and leased shooting preserves, and private and public fishing ponds. The landowner can obtain information from the Soil Conservation Service and the Pennsylvania Game Commission about trees, shrubs, vines, and field crops that help to encourage wildlife. Local soil conservationists and wildlife technicians will also help determine the practices most beneficial in establishing wildlife on a particular farm.

In table 2 the soils in the county have been rated according to their suitability as habitats for the principal kinds of game. The ratings given—high, medium, and low—take into account the characteristics and productivity of the soils and the relief, land use, and kinds of vegetation and habitats preferred by the particular species. Table 2 can be used along with the section "Descriptions of Soils" and with the detailed soil map at the back of the report to determine the suitability of the soils for various kinds of habitats. The kinds of habitat preferred by the various species of game are discussed in the paragraphs that follow. The land type Mine dumps is not included in the table because the soil material is variable.

Ruffed grouse are most abundant along the edges of hardwood forests, in clearings and along woods roads, and in brushy overgrown fields and pastures.

The cottontail rabbit thrives in most habitats, but it is most abundant in brushy areas that are interspersed with patches of grass. The cottontail rabbit is least abundant in large areas that are cultivated or that have a dense cover of trees.

TABLE 1.—*Estimated productivity ratings for soils used for field and forage crops at two levels of management*

[In columns A are productivity ratings for normal management, and in columns B are ratings for improved management. The absence of data indicates that the soil is not suited to the specified crop at the specified level of management. Strip mines, Mine dumps Made land, Gullied land, and some very steep and very stony soils are not rated]

Soils	Corn for grain (100=60 bu. per acre)		Oats (100=50 bu. per acre)		Wheat (100=30 bu. per acre)		Alfalfa-grass mixture (100=2.0 tons per acre)		Mixed hay (100=1.5 tons per acre)		Birdsfoot trefoil-grass mixture (100=1.75 tons per acre)	
	A	B	A	B	A	B	A	B	A	B	A	B
Atkins silt loam	----	----	----	50	----	50	----	----	45	100	45	115
Brinkerton silt loam, very wet, 0 to 3 percent slopes	----	----	----	----	----	----	----	----	----	90	----	100
Brinkerton silt loam, very wet, 3 to 8 percent slopes	----	----	----	----	----	----	----	----	----	100	----	110
Brinkerton and Armagh silt loams, 0 to 3 percent slopes	----	----	----	70	----	70	----	----	50	115	50	125
Brinkerton and Armagh silt loams, 3 to 8 percent slopes	----	----	----	70	----	70	----	----	50	115	50	125
Cavode silt loam, 0 to 3 percent slopes	70	125	50	110	50	90	50	90	80	135	85	150
Cavode silt loam, 3 to 8 percent slopes	80	130	70	120	70	100	60	100	85	140	85	150
Cavode silt loam, 3 to 8 percent slopes, moderately eroded	80	120	70	120	70	95	60	90	85	130	85	140
Cavode silt loam, 8 to 15 percent slopes	80	130	70	120	70	100	60	100	85	135	85	145
Cavode silt loam, 8 to 15 percent slopes, moderately eroded	75	110	70	110	70	95	50	85	85	130	85	140
Cavode silt loam, 15 to 25 percent slopes, moderately eroded	70	90	60	90	65	90	50	85	80	125	80	135
Cavode silty clay loam, 8 to 15 percent slopes, severely eroded	50	70	50	85	50	80	40	75	70	105	75	125
Cavode very stony silt loam, 0 to 8 percent slopes	----	----	----	----	----	----	----	----	----	----	----	100
Cavode very stony silt loam, 8 to 25 percent slopes	----	----	----	----	----	----	----	----	----	----	----	100
Cookport channery loam, 0 to 3 percent slopes	60	100	50	90	50	90	40	80	80	135	85	150
Cookport channery loam, 3 to 8 percent slopes	70	120	70	100	70	100	60	100	85	140	85	150
Cookport channery loam, 3 to 8 percent slopes, moderately eroded	65	110	60	100	60	100	50	90	85	140	85	150
Cookport channery loam, 8 to 15 percent slopes	60	100	55	95	55	95	50	90	80	135	80	140
Cookport loam, 0 to 3 percent slopes	60	100	50	90	50	90	40	80	80	135	85	150
Cookport loam, 3 to 8 percent slopes	70	120	70	100	70	100	60	100	85	140	85	150
Cookport loam, 3 to 8 percent slopes, moderately eroded	65	110	60	100	60	100	50	90	85	140	85	150
Cookport very stony loam, 0 to 8 percent slopes	----	----	----	----	----	----	----	----	----	----	----	100
Cookport very stony loam, 8 to 15 percent slopes	----	----	----	----	----	----	----	----	----	----	----	100
Dekalb channery loam, 0 to 5 percent slopes	75	120	90	110	90	110	90	130	95	140	95	150
Dekalb channery loam, 5 to 12 percent slopes	70	110	90	110	90	110	90	130	95	140	95	150
Dekalb channery loam, 5 to 12 percent slopes, moderately eroded	65	100	90	110	90	110	85	125	95	140	95	150
Dekalb channery loam, 12 to 20 percent slopes	60	90	80	100	80	100	80	115	85	130	90	140
Dekalb channery loam, 12 to 20 percent slopes, moderately eroded	55	85	80	100	80	100	75	100	80	120	90	140
Dekalb channery loam, 20 to 35 percent slopes	----	----	----	----	----	----	60	80	70	90	80	110
Dekalb channery loam, 20 to 35 percent slopes, moderately eroded	----	----	----	----	----	----	60	80	70	90	80	110
Dekalb loam, 0 to 5 percent slopes	75	120	90	110	90	110	90	130	95	140	95	150
Dekalb loam, 5 to 12 percent slopes	70	110	90	110	90	110	90	130	95	140	95	150
Dekalb loam, 5 to 12 percent slopes, moderately eroded	65	100	90	110	90	110	85	125	95	140	95	150
Dekalb loam, 12 to 20 percent slopes	60	90	80	100	80	100	80	115	85	130	90	140
Dekalb loam, 12 to 20 percent slopes, moderately eroded	55	85	80	100	80	100	75	100	80	120	90	140
Dekalb very stony loam, 0 to 12 percent slopes	----	----	----	----	----	----	----	----	----	----	----	75
Dekalb very stony loam, 12 to 35 percent slopes	----	----	----	----	----	----	----	----	----	----	----	70
Ernest silt loam, 0 to 3 percent slopes	85	130	80	120	80	115	85	135	90	140	90	145
Ernest silt loam, 3 to 8 percent slopes	90	140	90	125	90	125	90	140	95	145	95	150
Ernest silt loam, 3 to 8 percent slopes, moderately eroded	85	130	85	120	85	120	85	135	90	140	90	145
Ernest silt loam, 8 to 15 percent slopes	90	140	90	125	90	125	90	140	95	145	95	150
Ernest silt loam, 8 to 15 percent slopes, moderately eroded	85	130	85	120	85	120	85	135	90	140	90	145
Ernest silt loam, 8 to 15 percent slopes, severely eroded	----	----	50	90	60	95	40	80	70	105	80	125
Ernest very stony silt loam, 0 to 8 percent slopes	----	----	----	----	----	----	----	----	----	----	----	100
Ernest very stony silt loam, 8 to 25 percent slopes	----	----	----	----	----	----	----	----	----	----	----	95
Gilpin channery silt loam, 0 to 5 percent slopes	95	140	95	120	95	120	95	150	95	140	95	150
Gilpin channery silt loam, 5 to 12 percent slopes	95	130	95	120	95	120	95	150	95	140	95	150
Gilpin channery silt loam, 5 to 12 percent slopes, moderately eroded	85	125	95	120	95	120	90	140	90	135	95	150
Gilpin channery silt loam, 12 to 20 percent slopes	85	125	95	120	95	120	90	140	90	135	95	150
Gilpin channery silt loam, 12 to 20 percent slopes, moderately eroded	70	110	85	100	85	100	85	120	85	120	90	130
Gilpin channery silt loam, 12 to 20 percent slopes, severely eroded	----	----	----	60	----	60	----	70	----	70	60	100
Gilpin channery silt loam, 20 to 35 percent slopes	----	----	----	----	----	----	65	100	60	100	75	125
Gilpin channery silt loam, 20 to 35 percent slopes, moderately eroded	----	----	----	----	----	----	55	100	50	90	65	125

TABLE 1.—*Estimated productivity ratings for soils used for field and forage crops at two levels of management*—Con.

Soils	Corn for grain (100=60 bu. per acre)		Oats (100=50 bu. per acre)		Wheat (100=30 bu. per acre)		Alfalfa-grass mixture (100=2.0 tons per acre)		Mixed hay (100=1.5 tons per acre)		Birdsfoot trefoil-grass mixture (100=1.75 tons per acre)	
	A	B	A	B	A	B	A	B	A	B	A	B
Gilpin silt loam, 0 to 5 percent slopes	95	140	95	120	95	120	95	150	95	140	95	150
Gilpin silt loam, 5 to 12 percent slopes	95	130	95	120	95	120	95	150	95	140	95	150
Gilpin silt loam, 5 to 12 percent slopes, moderately eroded	85	125	95	120	95	120	90	140	90	135	95	150
Gilpin silt loam, 12 to 20 percent slopes	85	125	95	120	95	120	90	140	90	135	95	150
Gilpin silt loam, 12 to 20 percent slopes, moderately eroded	70	110	85	100	85	100	85	120	85	120	90	130
Gilpin silt loam, 20 to 35 percent slopes	-----	-----	-----	-----	-----	-----	65	100	60	100	75	125
Gilpin silt loam, 20 to 35 percent slopes, moderately eroded	-----	-----	-----	-----	-----	-----	55	100	50	90	65	125
Gilpin very stony silt loam, 0 to 12 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	100
Gilpin very stony silt loam, 12 to 35 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	90
Gilpin and Montevallo soils, 20 to 35 percent slopes, severely eroded	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	40	85
Gilpin-Upshur silty clay loams, 3 to 8 percent slopes, moderately eroded	95	130	95	120	95	120	100	140	100	140	100	150
Gilpin-Upshur silty clay loams, 8 to 25 percent slopes, moderately eroded	85	120	85	110	85	110	90	130	90	130	90	140
Guernsey silty clay loam, 0 to 3 percent slopes	75	120	60	110	60	90	75	110	80	140	85	150
Guernsey silty clay loam, 3 to 8 percent slopes, moderately eroded	80	130	70	120	70	100	80	120	80	140	85	150
Hartsells loam, 0 to 5 percent slopes	100	150	100	130	100	130	100	160	100	150	100	150
Hartsells loam, 5 to 12 percent slopes	100	150	100	130	100	130	100	160	100	150	100	150
Hartsells loam, 5 to 12 percent slopes, moderately eroded	95	145	100	130	95	125	95	155	95	140	100	150
Hartsells loam, 12 to 20 percent slopes, moderately eroded	90	140	95	125	90	120	90	150	95	140	90	140
Holston silt loam, 0 to 5 percent slopes	100	150	100	130	100	130	100	160	100	150	100	150
Holston silt loam, 5 to 12 percent slopes	100	150	100	130	100	130	100	160	100	150	100	150
Holston silt loam, 12 to 20 percent slopes, moderately eroded	90	140	90	120	90	120	90	150	95	140	90	140
Monongahela silt loam, 0 to 3 percent slopes	85	130	85	120	85	120	80	120	95	135	95	150
Monongahela silt loam, 3 to 8 percent slopes	85	130	85	120	85	120	80	120	95	135	95	150
Montevallo-Gilpin shaly silt loams, 0 to 5 percent slopes	-----	50	75	115	75	115	55	110	80	130	85	140
Montevallo-Gilpin shaly silt loams, 5 to 12 percent slopes, moderately eroded	-----	-----	50	70	50	70	-----	70	-----	70	70	100
Montevallo-Gilpin shaly silt loams, 12 to 20 percent slopes, moderately eroded	-----	-----	-----	60	-----	60	-----	70	-----	70	60	100
Nolo silt loam, 0 to 3 percent slopes	-----	-----	-----	70	-----	70	-----	-----	50	115	50	125
Nolo silt loam, 3 to 8 percent slopes	-----	-----	-----	70	-----	70	-----	-----	50	115	50	125
Philo silt loam	80	140	70	110	70	110	60	120	80	130	90	140
Pope fine sandy loam	100	150	100	130	100	130	100	140	100	140	100	150
Pope silt loam	100	150	100	130	100	130	100	140	100	140	100	150
Purdy silt loam	-----	-----	-----	60	-----	60	-----	-----	40	90	60	100
Sequatchie silt loam, 0 to 5 percent slopes	100	150	100	130	100	130	100	160	100	150	100	150
Shelocta silt loam, 3 to 8 percent slopes, moderately eroded	100	150	100	130	100	130	100	150	100	150	100	150
Tyler silt loam	75	120	65	110	60	90	-----	80	80	120	80	130
Wellston silt loam, 0 to 5 percent slopes	100	150	100	130	100	130	100	160	100	150	100	150
Wellston silt loam, 5 to 12 percent slopes, moderately eroded	95	145	95	125	95	125	95	150	95	150	95	150
Wellston silt loam, 12 to 20 percent slopes, moderately eroded	90	135	90	120	90	120	90	140	90	140	90	140
Westmoreland silt loam, 5 to 12 percent slopes, moderately eroded	100	150	100	130	100	130	100	160	100	150	100	150
Westmoreland silt loam, 12 to 20 percent slopes, moderately eroded	90	140	90	120	90	120	95	145	90	140	95	150
Westmoreland silt loam, 20 to 35 percent slopes, moderately eroded	-----	-----	-----	-----	-----	-----	80	125	80	125	90	140
Wharton silt loam, 0 to 3 percent slopes	90	135	85	110	80	115	70	110	90	130	90	140
Wharton silt loam, 3 to 8 percent slopes	95	140	95	125	90	125	90	130	95	140	95	150
Wharton silt loam, 3 to 8 percent slopes, moderately eroded	90	135	85	110	80	115	70	110	90	130	90	140
Wharton silt loam, 8 to 15 percent slopes, moderately eroded	85	130	80	100	75	100	70	110	85	125	85	135
Zoar silt loam, 0 to 3 percent slopes	90	140	90	125	90	125	90	140	95	145	95	150

Gray squirrel generally prefer wooded areas where there are many oaks, hickories, and other trees that bear nuts. They generally prefer to live near the edges and openings of woods.

White-tailed deer generally like second-growth hardwood forests, brushy areas, and the edges of open fields. Bear and wild turkey require large tracts of mature woodland.

TABLE 2.—*Suitability of soils as habitats for game*

Soil series and map symbols	Deer	Bear	Wild turkey	Grouse	Rabbit	Squirrel
Atkins (Aw)	High	Low	Low	High	Medium	Medium.
Brinkerton, very wet (BrA, BrB)	Medium	Low	Low	High	Low	Low.
Brinkerton and Armagh (BsA, BsB)	Medium	Low	Low	Medium	Medium	Medium.
Brinkerton and Armagh, very stony (BvB)	Medium	Low	Low	High	Low	Medium.
Cavode (CaA, CaB, CaB2, CaC, CaC2, CaD2, CcC3)	High	Low	Medium	Medium	High	High.
Cavode, very stony (CdB, CdD)	Medium	Low	Medium	Medium	Medium	High.
Cookport (CkA, CkB, CkB2, CkC, CpA, CpB, CpB2)	High	High	High	High	Medium	Medium.
Cookport, very stony (CsB, CsC)	Medium	High	High	High	Low	Medium.
Dekalb (DcA, DcB, DcB2, DcC, DcC2, DcD, DcD2, DcE, DhA, DhB, DhB2, DhC, DhC2).	High	High	High	Medium	Medium	Medium.
Dekalb, very stony (DkB, DkD, DkF)	Medium	High	High	High	Low	Medium.
Ernest (EnA, EnB, EnB2, EnC, EnC2, EnC3)	High	Medium	Medium	Medium	High	High.
Ernest, very stony (ErB, ErC)	High	High	High	High	Medium	High.
Gilpin (GcA, GcB, GcB2, GcC, GcC2, GcC3, GcD, GcD2, GgA, GgB, GgB2, GgC, GgC2, GgD, GgD2).	High	Low	Medium	Medium	High	High.
Gilpin, very stony (GlB, GlD, GlF)	High	Medium	Medium	Medium	Medium	High.
Gilpin and Montevallo (GmD3, GmF, GmF3)	Medium	Medium	Medium	Medium	High	High
Gilpin-Upshur (GpB2, GpD2)	Low	Low	Low	Low	High	Low.
Guernsey (GsA, GsB2)	Medium	Low	Low	Low	High	Medium.
Gullied land (GuB, GuD)	Low	Low	Low	Low	Medium	Medium.
Hartsells (HaA, HaB, HaB2, HaC2)	High	High	High	High	Medium	High.
Holston (HoA, HoB, HoC2)	Medium	Low	Low	Medium	High	High.
Leetonia, very stony (LeB, LeD, LeF)	Medium	Medium	Medium	Medium	Low	Low.
Made land (Ma)					Medium	
Monongahela (MoA, MoB)	Medium	Low	Medium	Medium	Medium	Medium.
Montevallo (MsD2)	Medium	Low	Medium	Medium	High	Medium.
Montevallo-Gilpin (MvA, MvB2, MvC2)	Medium	Low	Medium	Medium	High	Medium.
Nolo (NoA, NoB)	Medium	High	Low	High	Low	Low.
Nolo, very stony (NsB)	Medium	High	Low	High	Low	Low.
Philo (Ph)	High	Low	Medium	Medium	Medium	Medium.
Pope (Pp, Ps)	High	Low	Medium	Medium	Medium	Medium.
Purdy (Pu)	Medium	Low	Low	Medium	Medium	Medium.
Sequatchie (ScA)	Medium	Low	Low	Low	High	High.
Shelocta (ShB2)	Medium	Low	Low	Low	High	High.
Strip mines (Sm)	Medium	Low	Medium	Medium	High	Low.
Tyler (Ty)	Medium	Low	Low	Medium	Medium	Medium.
Wellston (WnA, WnB2, WnC2)	Medium	Low	Medium	Medium	High	High.
Westmoreland (WsB2, WsC2, WsD2)	High	Low	Low	Low	High	High.
Wharton (WtA, WtB, WtB2, WtC2)	High	Low	Medium	Medium	High	High.
Zoar (ZoA)	Medium	Low	Low	Medium	High	Medium.

Use of Soils for Woodland [2]

At the time the county was first settled, the area was covered by a dense forest. Clearing the land for farming and cutting the trees for commercial purposes have eliminated the virgin stands. The present woodland consists of second- and third-growth stands.

The forest types now in Jefferson County (*11*) and their proportionate extent are as follows (*14*):

	Percentage of total woodland in the county
Sugar maple-beech-yellow birch — Sugar maple, beech, and yellow birch are the component species; associates are basswood, red maple, red oak, white pine, and black cherry.	42
Red oak — Northern red oak is predominant; associates are black oak, scarlet oak, chestnut oak, and yellow-poplar.	26
White pine — Eastern white pine predominates; associates are black cherry, sugar maple, hemlock, white oak, and gray birch.	16
Hemlock — Eastern hemlock predominates over any single associate; among the associated species are beech, white ash, northern red oak, white oak, and red maple.	7
White oak — White oak in a pure stand or predominant in the stand; associates are black oak, northern red oak, shagbark hickory, bitternut hickory, white ash, and yellow-poplar.	6
Chestnut oak — Chestnut oak in a pure stand or predominant in the stand; common associates are scarlet oak, white oak, black oak, pitch pine, blackgum, and red maple; associates in a few places are white pine, red oak, and Virginia pine.	3

Sawtimber occupies approximately 27 percent of the acreage in commercial forest. Poletimber accounts for 49 percent, and seedlings, for 8 percent. The remaining 16 percent consists of areas that are not stocked or that are only sparsely populated with trees. In general the soils will support a good growth of red oak, black cherry, white pine, and yellow-poplar. Trees grow slowly, however, on the shallow soils and on the poorly drained soils. A large acreage, which at the present time is in red maple,

[2] By VERNAL C. MILES, woodland specialist, Soil Conservation Service, in cooperation with representatives of the Pennsylvania Department of Forest and Waters.

beech, and birch, is capable of supporting white pine, red oak, yellow-poplar, and black cherry.

More desirable kinds of trees can be encouraged to grow through the application of sound woodland management. The soils are suitable, climatic conditions are good, and knowledge to do the job is available.

Studies have been made of the rate at which trees grow on 5 extensive soils,[3] in 24 plots. The site index for oaks on each of these soils is based on the height attained by the average dominant (tallest) and codominant oaks at the age of 50 years. Foresters using this index can determine the volume of timber that normal stands will produce at different ages. Results of these studies and of similar studies made in other counties in Pennsylvania were useful in estimating the potential productivity of the soils, as shown in table 3.

Knowledge of the soil from which the trees and supporting vegetation grow is the starting point for establishing good management. Table 3 presents information that can be used by the layman and technician, working as a team, to arrive at certain decisions necessary for continuous improvement of the woodland. In table 3 the soils of the county have been placed in 14 woodland suitability groups. Each group is made up of soils that require the use of similar kinds of conservation practices and other management and that have comparable potential productivity. For each group, ratings are given according to the capabilities, the limitations, and the hazards on soils in woodland use. Site index ratings are given for each group, and suitable trees are listed by species priority. For the suitable trees listed by species priority, the names of preferred species for planting are given, as well as the names of native species that should be encouraged.

Each woodland suitability group has been rated for the various hazards and limitations described. The degree of rating is shown as *slight*, *moderate*, or *severe*.

TABLE 3.—*Soil interpretations*

[F-1 soils are excellent for timber; the site index for oaks on F-1 soils is 75 or better, and the expected yield is 13,750 board feet per acre fairly good for timber; the site index for oaks on F-3 soils is 55 to 64, and the expected yield is 6,300 board feet per acre. F-4 soils are for trees at 50 years of age]

Woodland suitability group and soils	Potential soil productivity for oak	Species priority
		Natural
Group 1: Deep, well-drained, nearly level to moderately sloping soils (HaA, HoA, Pp, Ps, ScA, ShB2, WnA).	F-1	Yellow-poplar, red oak, black cherry
Group 2: Deep, well-drained, moderately sloping to steep soils (HaB, HaB2, HaC2, HoB, HoC2, WnB2, WnC2, WsB2, WsC2, WsD2).	F-1	Yellow-poplar, red oak, black cherry
Group 3: Shallow to moderately deep, well-drained, nearly level to moderately sloping soils (DcA, DhA, DkB, GcA, GgA, GlB, GpB2).	F-2	Red oak, white pine, yellow-poplar, black cherry.
Group 4: Shallow to moderately deep, well-drained, moderately sloping to steep soils (DcB, DcB2, DcC, DcC2, DhB, DhB2, DhC, DhC2, DkD, GcB, GcB2, GcC, GcC2, GcC3, GgB, GgB2, GgC, GgC2, GlD, GpD2).	F-2	Red oak, white pine, yellow-poplar, black cherry.
Group 5: Shallow to moderately deep, well-drained, nearly level to steep soils that are low in fertility (LeB, LeD).	F-3	White pine, red oak
Group 6: Moderately deep, well-drained, steep soils (DcD, DcD2, GcD, GcD2, GgD, GgD2).	F-2	Red oak, white pine, yellow-poplar, white oak.
Group 7: Moderately deep to shallow, well-drained, steep and very steep soils (DcE, DkF, GlF, LeF).	F-3	White pine, red maple, red oak.
Group 8: Deep, moderately well drained or somewhat poorly drained, nearly level to gently sloping soils (CaA, CaB, CaB2, CdB, CkA, CkB, CkB2, CpA, CpB, CpB2, CsB, EnA, EnB, EnB2, ErB, GsA, GsB2, MoA, MoB, Ph, Ty, WtA, WtB, WtB2, ZoA).	F-2	White pine, yellow-poplar, ash, red oak, black cherry.
Group 9: Deep, moderately well drained or somewhat poorly drained, moderately sloping soils (CaC, CaC2, CaD2, CcC3, CdD, CkC, CsC, EnC, EnC2, EnC3, ErC, WtC2).	F-2	White pine, yellow-poplar, ash, sugar maple, red oak, black cherry.
Group 10: Deep, poorly drained or very poorly drained, nearly level to gently sloping soils (Aw, BrA, BrB, BsA, BsB, BvB, NoA, NoB, NsB, Pu).	F-3	White pine, hemlock, red maple.
Group 11: Shallow and very shallow, well-drained, nearly level to gently sloping soil (MvA).	F-3	White pine, aspen, red maple.
Group 12: Shallow and very shallow, well-drained, moderately sloping soils (MvB2, MvC2).	F-3	Aspen, white pine.
Group 13: Shallow and very shallow, well-drained, steep, or severely gullied land (GmD3, GmF, GmF3, GuB, GuD, MsD2).	F-4	Aspen, white pine, red maple.
Group 14: Strip mines (Sm)	([1])	Aspen, red maple.

[1] Variable.

[3] Results of these studies are on file in the State office of the Soil Conservation Service, Harrisburg, Pa.

Seedling mortality refers to the expected degree of mortality of naturally occurring or planted stock of proper grade and proper planting. With natural or planted seedlings, normal environmental factors are assumed. In other words, the rating arrived at is based on the soil, and all other factors are considered normal or average. Thus, a rating of *slight* indicates that no special problems are recognized. Ordinary losses expected because of soil influence would be no more than 25 percent of the planted stock. Normally, satisfactory restocking by initial planting could be expected. Ordinarily, adequate natural regeneration will take place.

A rating of *moderate* indicates that a moderate problem is recognized. Expected losses because of soil influences would ordinarily be between 25 and 50 percent. Normally, one could expect to do some replanting to fill in openings. Natural regeneration could not always be relied upon for adequate and immediate restocking.

A rating of *severe* means that planting losses amount to more than 50 percent of the stock planted, natural regeneration is not adequate, and a second or third planting may be needed. Also, the seedbed will require special preparation, and careful planting techniques will be needed.

Plant competition refers to the degree of competition and the rate that undesirable trees, brush, and grasses invade different soils.

Equipment limitations consist of those soil characteristics and topographic features that restrict or prohibit the use of equipment commonly used in tree harvesting, crop tending, or tree planting. In this county steepness of slope, surface stones and boulders, and prolonged wetness are the principal limitations that restrict the use of equipment.

Erosion hazard refers to the potential hazard of erosion when the soil is managed according to currently acceptable standards.

for woodland production

(*10*). F–2 soils are good for timber; the site index for oaks is 65 to 74, and the expected yield is 9,750 board feet per acre. F–3 soils are are poor for timber; the site index for oaks is 54 or less, and the expected yield is less than 3,250 board feet per acre. Expected yields

Species priority—Continued: Planted	Seedling mortality	Plant competition	Equipment limitation	Erosion hazard	Windthrow hazard
White pine, larch, Austrian pine, Norway spruce.	Slight	Severe	Slight	Slight	Slight.
White pine, larch, Norway spruce, Austrian spruce.	Slight	Severe	Moderate	Moderate	Slight.
White pine, larch, Norway spruce, Austrian pine.	Slight	Moderate	Slight	Slight	Slight.
White pine, larch, Norway spruce, Austrian pine.	Slight	Moderate	Moderate	Moderate	Slight.
White pine, Austrian pine, larch	Slight	Moderate	Moderate	Slight	Slight.
White pine, larch, Austrian pine	Slight	Slight	Moderate	Slight	Slight.
White pine, larch, Austrian pine	Severe	Slight	Severe	Moderate	Slight.
White pine, larch, spruce, Austrian pine	Slight	Severe	Slight	Slight	Moderate.
White pine, larch, spruce, Austrian pine	Slight	Severe	Moderate	Moderate	Slight.
White pine, white spruce	Severe	Moderate	Severe	Slight	Severe.
White pine, Austrian pine	Moderate	Moderate	Slight	Slight	Moderate.
White pine, Austrian pine	Moderate	Slight	Moderate	Moderate	Moderate.
White pine, Austrian pine	Severe	Slight	Moderate	Severe	Moderate.
Larch, white pine, Scotch pine, Austrian pine, black locust.	Moderate to severe.	Slight	Moderate to severe.	Moderate to severe.	Slight.

Windthrow hazard is an evaluation of the characteristics of the soils that control the development of the root systems of trees, and it reflects windfirmness.

Woodland suitability group 1

Deep, well-drained, nearly level to moderately sloping soils of uplands, terraces, and flood plains are in group 1. The following soils are in this group:

Hartsells loam, 0 to 5 percent slopes.
Holston silt loam, 0 to 5 percent slopes.
Pope fine sandy loam.
Pope silt loam.
Sequatchie silt loam, 0 to 5 percent slopes.
Shelocta silt loam, 3 to 8 percent slopes, moderately eroded.
Wellston silt loam, 0 to 5 percent slopes.

The Pope soils are subject to flooding by streams, which presents some special hazards to new plantings of trees.

Woodland suitability group 2

Deep, well-drained, moderately sloping to steep soils of uplands are in this group. The following soils are in the group:

Hartsells loam, 5 to 12 percent slopes.
Hartsells loam, 5 to 12 percent slopes, moderately eroded.
Hartsells loam, 12 to 20 percent slopes, moderately eroded.
Holston silt loam, 5 to 12 percent slopes.
Holston silt loam, 12 to 20 percent slopes, moderately eroded.
Wellston silt loam, 5 to 12 percent slopes, moderately eroded.
Wellston silt loam, 12 to 20 percent slopes, moderately eroded.
Westmoreland silt loam, 5 to 12 percent slopes, moderately eroded.
Westmoreland silt loam, 12 to 20 percent slopes, moderately eroded.
Westmoreland silt loam, 20 to 35 percent slopes, moderately eroded.

Woodland suitability group 3

The soils in this group are well drained, shallow to moderately deep, and nearly level to moderately sloping. They are on uplands underlain by interbedded, acid sandstone and shale. The following soils are in this group:

Dekalb channery loam, 0 to 5 percent slopes.
Dekalb loam, 0 to 5 percent slopes.
Dekalb very stony loam, 0 to 12 percent slopes.
Gilpin channery silt loam, 0 to 5 percent slopes.
Gilpin silt loam, 0 to 5 percent slopes.
Gilpin very stony silt loam, 0 to 12 percent slopes.
Gilpin-Upshur silty clay loams, 3 to 8 percent slopes, moderately eroded.

Equipment limitations are moderate on the very stony soils of the Dekalb and Gilpin series.

Woodland suitability group 4

Shallow to moderately deep, well-drained, moderately sloping to steep soils of uplands make up this group. These soils are underlain by acid shale, siltstone, and sandstone. The following soils are in this group:

Dekalb channery loam, 5 to 12 percent slopes.
Dekalb channery loam, 5 to 12 percent slopes, moderately eroded.
Dekalb channery loam, 12 to 20 percent slopes.
Dekalb channery loam, 12 to 20 percent slopes, moderately eroded.
Dekalb loam, 5 to 12 percent slopes.
Dekalb loam, 5 to 12 percent slopes, moderately eroded.
Dekalb loam, 12 to 20 percent slopes.
Dekalb loam, 12 to 20 percent slopes, moderately eroded.
Dekalb very stony loam, 12 to 35 percent slopes.
Gilpin channery silt loam, 5 to 12 percent slopes.
Gilpin channery silt loam, 5 to 12 percent slopes, moderately eroded.
Gilpin channery silt loam, 12 to 20 percent slopes.
Gilpin channery silt loam, 12 to 20 percent slopes, moderately eroded.
Gilpin channery silt loam, 12 to 20 percent slopes, severely eroded.
Gilpin silt loam, 5 to 12 percent slopes.
Gilpin silt loam, 5 to 12 percent slopes, moderately eroded.
Gilpin silt loam, 12 to 20 percent slopes.
Gilpin silt loam, 12 to 20 percent slopes, moderately eroded.
Gilpin very stony silt loam, 12 to 35 percent slopes.
Gilpin-Upshur silty clay loams, 8 to 25 percent slopes, moderately eroded.

Seedling mortality is moderate on the severely eroded Gilpin soil.

Woodland suitability group 5

Shallow to moderately deep, well-drained, nearly level to steep soils are in this group. The soils are underlain by sandstone. They are very low in natural fertility. The following soils are in this group:

Leetonia very stony sandy loam, 0 to 12 percent slopes.
Leetonia very stony sandy loam, 12 to 35 percent slopes.

Woodland suitability group 6

The soils in this group are moderately deep and well drained. They are on steep uplands and are underlain by acid shale, siltstone, and sandstone. The following soils are in this group:

Dekalb channery loam, 20 to 35 percent slopes.
Dekalb channery loam, 20 to 35 percent slopes, moderately eroded.
Gilpin channery silt loam, 20 to 35 percent slopes.
Gilpin channery silt loam, 20 to 35 percent slopes, moderately eroded.
Gilpin silt loam, 20 to 35 percent slopes.
Gilpin silt loam, 20 to 35 percent slopes, moderately eroded.

Woodland suitability group 7

Moderately deep to shallow, well-drained, steep and very steep soils on uplands make up this group. These soils are underlain by acid shale, siltstone, and sandstone. The following soils are in this group:

Dekalb channery loam, 35 to 60 percent slopes.
Dekalb very stony loam, 35 to 100 percent slopes.
Gilpin very stony silt loam, 35 to 60 percent slopes.
Leetonia very stony sandy loam, 35 to 80 percent slopes.

The potential soil productivity is F–4 (see table 3) for the Leetonia soil.

Woodland suitability group 8

In this group are deep, moderately well drained or somewhat poorly drained, nearly level to gently sloping soils. The following soils are in this group:

Cavode silt loam, 0 to 3 percent slopes.
Cavode silt loam, 3 to 8 percent slopes.
Cavode silt loam, 3 to 8 percent slopes, moderately eroded.
Cavode very stony silt loam, 0 to 8 percent slopes.
Cookport channery loam, 0 to 3 percent slopes.
Cookport channery loam, 3 to 8 percent slopes.
Cookport channery loam, 3 to 8 percent slopes, moderately eroded.
Cookport loam, 0 to 3 percent slopes.
Cookport loam, 3 to 8 percent slopes.
Cookport loam, 3 to 8 percent slopes, moderately eroded.
Cookport very stony loam, 0 to 8 percent slopes.
Ernest silt loam, 0 to 3 percent slopes.
Ernest silt loam, 3 to 8 percent slopes.
Ernest silt loam, 3 to 8 percent slopes, moderately eroded.

Ernest very stony silt loam, 0 to 8 percent slopes.
Guernsey silty clay loam, 0 to 3 percent slopes.
Guernsey silty clay loam, 3 to 8 percent slopes, moderately eroded.
Monongahela silt loam, 0 to 3 percent slopes.
Monongahela silt loam, 3 to 8 percent slopes.
Philo silt loam.
Tyler silt loam.
Wharton silt loam, 0 to 3 percent slopes.
Wharton silt loam, 3 to 8 percent slopes.
Wharton silt loam, 3 to 8 percent slopes, moderately eroded.
Zoar silt loam, 0 to 3 percent slopes.

The potential soil productivity is F–1 (see table 3) on the nonstony Cavode, Guernsey, and Wharton soils. Equipment limitations are moderate on all of the very stony soils and on the other Cavode, Guernsey, Tyler, and Wharton soils. The hazard of erosion on the moderately eroded soils of the Cavode, Cookport, Ernest, Guernsey, and Wharton series is moderate. The windthrow hazard is slight on the Cavode, Ernest, Philo, Tyler, Wharton, and Zoar soils.

Woodland suitability group 9

Moderately well drained or somewhat poorly drained, deep, moderately sloping soils make up this group. The following soils are in this group:

Cavode silt loam, 8 to 15 percent slopes.
Cavode silt loam, 8 to 15 percent slopes, moderately eroded.
Cavode silt loam, 15 to 25 percent slopes, moderately eroded.
Cavode silty clay loam, 8 to 15 percent slopes, severely eroded.
Cavode very stony silt loam, 8 to 25 percent slopes.
Cookport channery loam, 8 to 15 percent slopes.
Cookport very stony loam, 8 to 15 percent slopes.
Ernest silt loam, 8 to 15 percent slopes.
Ernest silt loam, 8 to 15 percent slopes, moderately eroded.
Ernest silt loam, 8 to 15 percent slopes, severely eroded.
Ernest very stony silt loam, 8 to 25 percent slopes.
Wharton silt loam, 8 to 15 percent slopes, moderately eroded.

The equipment limitations and hazard of erosion are severe on the very stony Cavode soil, on the severely eroded Cavode soil, and on Cavode silt loam, 15 to 25 percent slopes, moderately eroded. The hazard of erosion is severe on the severely eroded Ernest soil.

Woodland suitability group 10

Nearly level to gently sloping, poorly drained or very poorly drained, deep soils make up group 10. The following soils are in this group:

Atkins silt loam.
Brinkerton silt loam, very wet, 0 to 3 percent slopes.
Brinkerton silt loam, very wet, 3 to 8 percent slopes.
Brinkerton and Armagh silt loams, 0 to 3 percent slopes.
Brinkerton and Armagh silt loams, 3 to 8 percent slopes.
Brinkerton and Armagh very stony silt loams, 0 to 8 percent slopes.
Nolo silt loam, 0 to 3 percent slopes.
Nolo silt loam, 3 to 8 percent slopes.
Nolo very stony silt loam, 0 to 8 percent slopes.
Purdy silt loam.

The potential soil productivity is F–4 (see table 3) for the very wet Brinkerton silt loams. Seedling mortality is moderate for the Brinkerton and Armagh silt loams.

Woodland suitability group 11

Montevallo-Gilpin shaly silt loams, 0 to 5 percent slopes, is the only unit in this group. These soils are shallow and very shallow, well drained, and nearly level to gently sloping. They are underlain by shale and thin-bedded sandstone.

Woodland suitability group 12

Shallow and very shallow, well-drained, moderately sloping soils underlain by shale and thin-bedded sandstone make up group 12. The following soils are in this group:

Montevallo-Gilpin shaly silt loams, 5 to 12 percent slopes, moderately eroded.
Montevallo-Gilpin shaly silt loams, 12 to 20 percent slopes, moderately eroded.

Woodland suitability group 13

In this group are shallow and very shallow, well-drained, steep soils. These soils are underlain by shale and thin-bedded sandstone. Some areas are severely gullied. The following soils are in this group:

Gilpin and Montevallo soils, 20 to 35 percent slopes, severely eroded.
Gilpin and Montevallo soils, 35 to 60 percent slopes.
Gilpin and Montevallo soils, 35 to 60 percent slopes, severely eroded.
Gullied land, 3 to 12 percent slopes.
Gullied land, 12 to 35 percent slopes.
Montevallo shaly silt loam, 20 to 35 percent slopes, moderately eroded.

The equipment limitations are severe for Gilpin and Montevallo soils, 35 to 60 percent slopes.

Woodland suitability group 14

Strip mines is the only mapping unit in this group. The productivity of the areas is variable and is directly related to the degree of acidity, steepness of slope, and stoniness of the spoil.

Engineering Applications [4]

This section contains information that can be used by engineers to—

(1) Make soil and land use studies that will aid in selecting and developing industrial, business, residential, and recreational sites.
(2) Make estimates of characteristics of runoff and erosion for use in designing drainage structures and in planning dams and other structures for soil and water conservation.
(3) Estimate the suitability of sites for disposing of liquid waste from processing plants.
(4) Determine the suitability of sites for disposal fields for septic tank systems.
(5) Estimate the characteristics of the material encountered when excavating for buildings and other structures.
(6) Make reconnaissance surveys of soil and ground conditions that will aid in selecting locations for highways and airports and in planning detailed soil surveys of the intended locations.
(7) Correlate the performance of pipelines with soil types to aid in installing and maintaining the pipelines.
(8) Correlate pavement performance with the type of soil and thus develop information useful in designing and maintaining pavements.

---

[4] By DONALD MCCANDLESS, JR., engineering specialist, Soil Conservation Service.

(9) Determine the suitability of soil units for cross-country movement of vehicles and construction equipment.

(10) Supplement information obtained from other published maps, reports, and aerial photographs for the purpose of making available soil information that can be used readily by engineers.

Soil engineering data

Some engineering information can be obtained from the soil map. It is often necessary, however, to refer to other parts of the report, particularly to the sections "Descriptions of Soils"; "Use and Management of the Soils"; "Formation, Morphology, and Classification of Soils"; and "Geology."

The mapping and the descriptive report are somewhat generalized, however, and should be used only in planning more detailed field surveys to determine the in-place condition of the soil at the site of proposed engineering construction.

At many construction sites major variations in the soils may occur within the depth of the proposed excavation, and several different kinds of soil may occur within short distances. The soil map, the detailed description of the soils, and the engineering data and recommendations given in this section should be used to plan detailed surveys of soils at construction sites. The soil survey report will enable the soil engineer to concentrate on the most suitable soil units and to take a minimum number of soil samples for testing in the laboratory. Therefore, an adequate soil investigation can be made at minimum cost.

Some of the terms used by the agricultural soil scientists may be unfamiliar to the engineer, and some words—for example, clay, silt, sand, and aggregate—may have special meanings in soil science. These and other special terms that are used in the soil survey report are defined in the Glossary at the back of this report.

TABLE 4.—*Engineering test data* [1] *for soil samples*

[Absence of data indicates information

Soil name and location	Parent rock	Pennsylvania report No.	Depth	Horizon	Moisture-density [2]	
					Maximum dry density	Optimum moisture
			Inches		*Lb. per cu. ft.*	*Percent*
Armagh silt loam:						
2 miles S. of Brookville on Port Barnett-Knox Dale Road. (Modal profile)	Clay shale of the Allegheny formation.	BE–1683	15–23	B22g	110	17
		BE–1684	38–48	C2g	114	15
1.8 miles E. of Heath Station. (Finer textured than modal profile)	Clay shale of the Allegheny formation.	BE–27783	18–24	B22g	113	14
		BE–27784	31–42+	C2g	118	12
3 miles S. of Reynoldsville. (Shallower than modal profile)	Clay shale of the Allegheny formation.	BE–1687	12–20	B22g	103	20
		BE–767	20–25	C1	109	17
Brinkerton silt loam:						
0.6 mile W. and 0.7 mile N. of Knox Dale on road T407. (Modal profile)	Colluvium of sandstone and shale.	BC–31200	11–19	B2g	106	20
		BC–31201	34–48	C1	112	15
15 miles N. of Brookville at Dutch Hill. (Coarse-textured profile)	Colluvium of sandstone and shale.	BE–28473	9–13	B21g	112	16
		BE–28474	28–36	C2g	111	17
12 miles NE. of Brookville. (Finer textured than modal profile)	Colluvium of sandstone and shale.	BE–28475	8–17	B2g	112	15
		BE–28476	35–45	C1	122	12
Cavode silt loam:						
0.5 mile SW. of Brookville on Route 28. (Modal profile)	Clay shale of the Allegheny formation.	BE–1681	21–31	B23g	111	15
		BE–1682	42–54	C	118	12
500 feet S. of Stanton. (Finer textured than modal profile)	Clay shale of the Allegheny formation.	BE–3449	17–39	B2g	113	16
		BE–3450	39–45	C	121	13
1.3 miles N. and 0.7 mile W. of Brookville. (Coarser textured than modal profile)	Sandstone and shale.	BE–3445	20–32	B2g	104	20
		BE–3446	32–40	C	117	14

See footnotes at end of table.

Engineering classification systems

Engineers commonly use two classification systems that express, by means of symbols, the relative suitability of soil materials for use in structures.

AASHO system.—Most highway engineers classify soil material in accordance with the system approved by the American Association of State Highway Officials (AASHO) (*1*). In this system soil material is classified in seven principal groups. The groups range from A–1, consisting of gravelly soils of high bearing capacity, to A–7, consisting of clayey soils that have low strength when wet. Within each group the relative engineering value of the soil material is indicated by a group index number. Group indexes range from 0, for the best materials, to 20 for the poorest.

Unified system.—In this system soil material is identified as coarse grained (eight classes), fine grained (six classes), or highly organic (one class) (*18*). The symbols that express these various classes are used in table 5. The classes are defined in more detail in the "PCA Soil Primer" published by the Portland Cement Association (*9*).

Table 4 gives engineering test data for 24 soil profiles sampled as representative of 8 important soil series in this county. The samples represent modal conditions and extremes in the named soil types. Tests were made by the Pennsylvania Department of Highways Soil Testing Laboratories, Harrisburg, Pa.

Tables 5 and 6 give engineering data on the soils of Jefferson County. Information in these tables is based on the engineering test data in table 4 and on material from other parts of the report. Table 5 shows estimated physical properties of the soils significant to engineering. Table 6 gives factors important to engineering and hazards that affect different kinds of engineering on the various soils.

taken from 24 soil profiles in Jefferson County

is not available or not applicable]

Mechanical analysis [3]										Liquid limit	Plasticity index	Classification	
Percentage passing sieve—						Percentage smaller than—						AASHO [4]	Unified [5]
3-in.	¾ in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
--------	100	97	91	83	75	71	56	38	29	40	14	A–6(10)	ML–CL.
--------	100	96	89	87	85	83	67	48	31	35	11	A–6(8)	ML–CL.
100	96	92	87	86	73	68	50	34	28	31	8	A–4(8)	ML–CL.
100	99	81	72	71	65	61	44	25	21	25	5	A–4(6)	ML–CL.
--------	100	89	87	86	81	77	65	44	33	42	15	A–7–6(10)	ML–CL.
100	61	43	39	36	32	31	23	17	13	40	13	A–2–6(0)	GM–GC.
100	98	96	95	93	89	87	72	49	38	42	14	A–7–6(10)	ML.
100	99	98	97	95	91	90	73	50	38	34	11	A–6(8)	ML–CL.
--------	--------	100	99	98	82	75	55	38	31	33	11	A–6(8)	ML–CL.
--------	--------	100	99	98	75	68	49	35	29	33	10	A–4(8)	ML–CL.
--------	100	96	89	81	70	67	49	31	24	34	8	A–4(7)	ML.
100	89	70	59	48	39	37	28	19	14	28	7	A–4(1)	SM–SC.
100	98	97	95	90	86	84	67	44	33	34	10	A–4(8)	ML–CL.
100	99	93	87	78	74	71	53	30	22	30	9	A–4(8)	ML–CL.
--------	100	98	96	94	90	85	66	41	30	40	14	A–6(10)	ML–CL.
100	95	53	36	27	23	22	16	11	8	34	9	A–2–4(0)	GM–GC.
100	75	74	73	72	63	62	56	41	31	45	16	A–7–6(9)	ML.
100	65	57	54	49	38	35	27	17	13	29	7	A–4(1)	GM–GC.

TABLE 4.—*Engineering test data*[1] *for soil samples taken*

[Absence of data indicates information

Soil name and location	Parent rock	Pennsylvania report No.	Depth	Horizon	Moisture-density[2] Maximum dry density	Moisture-density[2] Optimum moisture
			Inches		*Lb. per cu. ft.*	*Percent*
Cookport very stony loam:						
9 miles W. of Ross Leffler School of Conservation entrance on road T33067. (Modal profile)	Sandstone of the Allegheny formation.	BC–31193	16–22	B21	111	12
		BC–31194	41–47	C1	114	14
10 miles N. of Brookville. (Coarser textured than modal profile)	Sandstone of the Allegheny formation.	BE–15993	11–20	B21	122	11
		BE–15994	39–55	C1	129	9
8 miles N. of Brookville. (Finer textured than modal profile)	Sandstone of the Allegheny formation.	BE–15987	17–23	B21	113	16
		BE–15988	45–53+	C1	118	14
Dekalb very stony loam:						
2.5 miles W. of Green Briar. (Modal profile)	Sandstone of the Allegheny formation.	BC–31195	9–18	B21	118	13
		BC–31196	24–31	B3	120	12
1.2 miles from Clear Creek State Park Office on Beartown Rocks Road. (Coarse-textured profile)	Sandstone of the Allegheny formation.	BE–15991	4–14	B	114	11
		BE–15992	14–34	C	116	11
Hays Lot Fire Tower Road. (Finer textured than modal profile)	Sandstone of the Allegheny formation.	BE–15989	9–15	B21	112	14
		BE–15990	22–30	B3	122	11
Ernest silt loam:						
4 miles S. of Brookville. (Modal profile)	Old colluvium.	BE–1685	20–31	B22g	107	18
		BE–1686	42–50	C1	119	13
1.6 miles S. of Stanton. (Finer textured than modal profile).	Old colluvium.	BE–3451	24–31	B22	111	16
		BE–3452	31–52	C	114	14
3 miles N. of Brookville. (Shallow profile)	Old colluvium.	BE–3447	16–26	B22	111	17
		BE–3448	26–45	C	119	14
Gilpin channery loam:						
1.6 miles S. of Ohl. (Modal profile)	Shale of the Conemaugh formation.	BC–31198	8–14	B2	119	13
		BC–31199	18–22	C1	----------	----------
Gilpin channery silt loam:						
10 miles SW. of Brookville; 2.1 miles N. of Ringgold. (Coarse-textured profile)	Shale of the Conemaugh formation.	BE–3453	6–18	B	118	14
		BE–3454	18–24	C	120	12
2.5 miles SW. of Brookville. (Fine-textured profile)	Shale and sandstone.	BE–15995	15–25	B22	118	13
		BE–15996	25–36	C	119	13
Montevallo shaly silt loam:						
0.9 mile SW. of Brookville. (Modal profile)	Shale.	BC–31197	8–12	C1	107	18
0.5 mile SW. of Brookville. (Finer textured than modal profile)	Shale.	BE–30862	5–14	B2	117	13
		BE–30863	14–28	C1	118	13
15 miles S. of Brookville. (Coarser textured than modal profile)	Shale.	BE–28477	8–17	C	122	13

[1] Tests performed by the Pennsylvania Department of Highways in accordance with standard procedures of the American Association of State Highway Officials (AASHO).

[2] Based on the Moisture-Density Relations of Soils Using 5.5-lb. Rammer and 12-in. Drop, AASHO Designation T 99–57, Method A.

[3] Mechanical analyses according to the AASHO Designation T 88–57. Results by this procedure frequently may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in di-

from 24 soil profiles in Jefferson County—Continued

is not available or not applicable]

Mechanical analysis [3]										Liquid limit	Plasticity index	Classification	
Percentage passing sieve—						Percentage smaller than—						AASHO [4]	Unified [5]
3-in.	¾ in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
100	96	93	92	91	65	61	50	37	28	27	8	A-4(6)	CL.
100	90	83	80	78	51	47	42	29	23	28	8	A-4(3)	CL.
--------	100	86	74	50	38	37	29	18	14	32	10	A-4(1)	SM-SC.
100	96	78	71	47	32	31	23	15	9	24	5	A-2-4(0)	SM-SC.
100	70	68	67	63	42	41	34	23	18	31	10	A-4(1)	GM-GC.
100	84	74	69	65	53	48	31	19	12	28	6	A-4(4)	ML-CL.
100	86	79	76	69	42	41	34	19	13	23	4	A-4(1)	SM-SC.
100	59	52	50	45	27	26	22	11	7	21	4	A-2-4(0)	GM-GC.
100	35	25	24	20	5	4	4	2	1	17	0	A-1-a(0)	GP-GM.
100	40	28	26	23	5	5	4	2	1	18	0	A-1-a(0)	GW-GM.
100	76	69	68	65	43	41	25	13	10	27	7	A-4(2)	GM-GC.
100	73	66	63	61	32	30	24	14	11	21	5	A-2-4(0)	SM-SC.
--------	100	97	96	94	89	86	68	44	34	37	12	A-6(9)	ML-CL.
100	92	80	76	71	65	63	48	29	21	26	6	A-4(6)	ML-CL.
--------	100	97	95	92	80	76	57	33	24	33	10	A-4(8)	ML-CL.
100	96	87	80	75	64	59	44	25	18	29	6	A-4(6)	ML-CL.
100	97	91	85	79	74	71	55	34	25	36	11	A-6(8)	ML-CL.
100	80	70	63	55	47	43	33	20	15	32	11	A-6(3)	GC.
100	46	36	30	25	22	21	16	11	8	28	4	A-1-b(0)	GM-GC.
100	36	18	14	11	9	8	7	4	3	28	5	A-1-a(0)	GM-GC.
100	80	55	45	39	33	30	24	16	12	32	8	A-2-4(0)	GM-GC.
100	71	41	33	28	23	21	16	11	9	34	9	A-2-4(0)	GM-GC.
100	84	69	65	63	46	44	30	15	10	26	6	A-4(2)	GM-GC.
100	66	49	46	45	31	29	18	9	7	24	3	A-2-4(0)	GM.
100	96	72	66	62	60	59	54	41	30	46	16	A-7-5(8)	ML.
100	78	56	46	38	33	31	24	13	8	30	6	A-2-4(0)	GM-GC.
100	65	37	30	26	18	16	12	6	4	28	4	A-1-b(0)	GM-GC.
100	75	29	20	15	13	12	8	5	3	28	6	A-1-2(0)	GM-GC.

ameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fraction. The mechanical analyses used in this table are not suitable for use in naming textural classes for soil.

[4] Based on Standard Specifications for Highway Materials and Methods of Sampling and Testing (Pt. 1, Ed. 8): The Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes, AASHO Designation M 145-49.

[5] Based on the Unified Soil Classification System, Tech. Memo. No. 3-357, v. 1, Waterways Expt. Sta., Corps of Engin., Mar. 1953.

TABLE 5.—*Brief description of the*

Map symbol	Soil	Depth to seasonally high water table	Depth to bed-rock	Description of soil and site	Depth from surface
		Feet	*Feet*		*Inches*
Aw	Atkins silt loam.	0	3–10	3 to 10 feet of poorly drained, medium-textured, acid silt loam on flood plains, in small areas that are widely distributed along streams; subject to flooding for short periods.	0–60
BrA BrB	Brinkerton silt loam, very wet, 0 to 3 percent slopes. Brinkerton silt loam, very wet, 3 to 8 percent slopes.	0	4–10	4 to 10 feet of poorly drained or very poorly drained silt loam to silty clay loam, mostly in depressions where surface drainage is poorly established; in many areas there are numerous boulders; in places some of the boulders have been moved onto these soils from surrounding soils.	0–36 36–84
BsA BsB BvB	Brinkerton and Armagh silt loams, 0 to 3 percent slopes. Brinkerton and Armagh silt loams, 3 to 8 percent slopes. Brinkerton and Armagh very stony silt loams, 0 to 8 percent slopes.	0	3–20	3 to 20 feet of poorly drained, fine- to medium-textured, acid soils, generally on concave, lower slopes where the ground water level is high much of the time and seepage is common; the subsoil and substratum are plastic and very slowly permeable; a high water table persists throughout much of the year; in many places sandstone boulders are throughout the soils.	0–30 30–120
CaA CaB CaB2 CaC CaC2 CaD2 CcC3 CdB CdD	Cavode silt loam, 0 to 3 percent slopes. Cavode silt loam, 3 to 8 percent slopes. Cavode silt loam, 3 to 8 percent slopes, moderately eroded. Cavode silt loam, 8 to 15 percent slopes. Cavode silt loam, 8 to 15 percent slopes, moderately eroded. Cavode silt loam, 15 to 25 percent slopes, moderately eroded. Cavode silty clay loam, 8 to 15 percent slopes, severely eroded. Cavode very stony silt loam, 0 to 8 percent slopes. Cavode very stony silt loam, 8 to 25 percent slopes.	0	3–5	3 to 5 feet of somewhat poorly drained silt loam to silty clay developed in material weathered from acid clay shale commonly called fire clay; the soils are plastic and sticky when wet and are slowly permeable so that they remain wet for extended periods; in a few areas some sandstone boulders are mixed with the fine soil material.	0–36 36–48
CkA CkB CkB2 CkC CpA CpB CpB2 CsB CsC	Cookport channery loam, 0 to 3 percent slopes. Cookport channery loam, 3 to 8 percent slopes. Cookport channery loam, 3 to 8 percent slopes, moderately eroded. Cookport channery loam, 8 to 15 percent slopes. Cookport loam, 0 to 3 percent slopes. Cookport loam, 3 to 8 percent slopes. Cookport loam, 3 to 8 percent slopes, moderately eroded. Cookport very stony loam, 0 to 8 percent slopes. Cookport very stony loam, 8 to 15 percent slopes.	1½	3–6	3 to 6 feet of moderately well drained loam developed on mixed sandstone and shale; the upper part of the soil is permeable, but the lower part of the subsoil and substratum have platy structure and slow permeability; the water table is high for fairly short periods in wet seasons; some areas have sandstone boulders as large as 3 feet in diameter scattered throughout the profile.	0–24 24–60
DcA DcB DcB2 DcC DcC2 DcD DcD2 DcE DhA DhB DhB2	Dekalb channery loam, 0 to 5 percent slopes. Dekalb channery loam, 5 to 12 percent slopes. Dekalb channery loam, 5 to 12 percent slopes, moderately eroded. Dekalb channery loam, 12 to 20 percent slopes. Dekalb channery loam, 12 to 20 percent slopes, moderately eroded. Dekalb channery loam, 20 to 35 percent slopes. Dekalb channery loam, 20 to 35 percent slopes, moderately eroded. Dekalb channery loam, 35 to 60 percent slopes. Dekalb loam, 0 to 5 percent slopes. Dekalb loam, 5 to 12 percent slopes. Dekalb loam, 5 to 12 percent slopes, moderately eroded.	3+	1½–5	1½ to 5 feet of well-drained, medium-textured to moderately coarse textured, acid soils that contain many coarse fragments of sandstone; most areas have sandstone boulders as large as 3 feet in diameter throughout the profile.	0–18 18–30

soils and their estimated properties

Classification		Percentage passing sieve—			Permeability	Available moisture capacity	Reaction	Optimum moisture for compaction	Maximum density (wet)	Shrink-swell potential
Unified [1]	AASHO [2]	No. 4	No. 10	No. 200						
					Inches per hour	*Inches per inch*	*pH*	*Percent*	*Lbs. per cu. ft.*	
ML	A-4	85-95	75-85	65-75	0. 2-2. 0	0. 17	6. 0	15	125	Low.
CL-ML	A-4, A-6	98	90-95	80-90	0. 2-6. 3	. 20	5. 5	17	130	Medium.
CL-ML	A-4, A-6	90-100	80-90	65-75	<0. 3	. 08	6. 0	15	130	Medium.
CL-ML	A-7-6	95-100	97	75-85	<0. 63	. 23	5. 5	18	129	Medium.
CL-ML	A-4, A-7-6	85-95	80-85	65-75	<0. 2	. 07	6. 5	15	132	Medium.
ML or ML-CL	A-4, A-7-6	85-95	85-95	75-85	0. 2-0. 63	. 17	5. 0	17	128	Medium.
GM-GC, ML-CL.	A-2-4, A-4	65-75	55-65	25-60	<0. 2	. 16	5. 2	13	134	Low.
CL, SM-SC	A-4	75-90	75-85	45-55	2. 0-6. 3	. 17	5. 0	13	134	Low.
CL-SC	A-2-4, A-4	75-85	70-80	30-50	0. 2-2. 0	. 09	5. 2	12	135	Low.
SM-SC, GM-GC.	A-4	70-80	65-75	35-45	2. 0-6. 3	. 14	4. 8	14	131	Low.
GM-GC, SM-SC.	A-2-4	55-65	50-60	25-35	2. 0-6. 3	. 11	5. 0	12	135	Low.

See footnotes at end of table.

TABLE 5.—*Brief description of the soils*

Map symbol	Soil	Depth to seasonally high water table	Depth to bed-rock	Description of soil and site	Depth from surface
		Feet	*Feet*		*Inches*
DhC DhC2 DkB DkD DkF	Dekalb loam, 12 to 20 percent slopes. Dekalb loam, 12 to 20 percent slopes, moderately eroded. Dekalb very stony loam, 0 to 12 percent slopes. Dekalb very stony loam, 12 to 35 percent slopes. Dekalb very stony loam, 35 to 100 percent slopes.				
EnA EnB EnB2 EnC EnC2 EnC3 ErB ErC	Ernest silt loam, 0 to 3 percent slopes. Ernest silt loam, 3 to 8 percent slopes. Ernest silt loam, 3 to 8 percent slopes, moderately eroded. Ernest silt loam, 8 to 15 percent slopes. Ernest silt loam, 8 to 15 percent slopes, moderately eroded. Ernest silt loam, 8 to 15 percent slopes, severely eroded. Ernest very stony silt loam, 0 to 8 percent slopes. Ernest very stony silt loam, 8 to 25 percent slopes.	1½	3–20	3 to 20 feet of moderately well drained or somewhat poorly drained, acid silt loam to silty clay that generally contains a few fragments of sandstone as large as 10 inches in diameter; some areas contain larger boulders; the subsoil and substratum are very compact and are slightly plastic and sticky when wet.	0–36 36–120
GcA GcB GcB2 GcC GcC2 GcC3 GcD GcD2 GgA GgB GgB2 GgC GgC2 GgD GgD2 GlB GlD GlF	Gilpin channery silt loam, 0 to 5 percent slopes. Gilpin channery silt loam, 5 to 12 percent slopes. Gilpin channery silt loam, 5 to 12 percent slopes, moderately eroded. Gilpin channery silt loam, 12 to 20 percent slopes. Gilpin channery silt loam, 12 to 20 percent slopes, moderately eroded. Gilpin channery silt loam, 12 to 20 percent slopes, severely eroded. Gilpin channery silt loam, 20 to 35 percent slopes. Gilpin channery silt loam, 20 to 35 percent slopes, moderately eroded. Gilpin silt loam, 0 to 5 percent slopes. Gilpin silt loam, 5 to 12 percent slopes. Gilpin silt loam, 5 to 12 percent slopes, moderately eroded. Gilpin silt loam, 12 to 20 percent slopes. Gilpin silt loam, 12 to 20 percent slopes, moderately eroded. Gilpin silt loam, 20 to 35 percent slopes. Gilpin silt loam, 20 to 35 percent slopes, moderately eroded. Gilpin very stony silt loam, 0 to 12 percent slopes. Gilpin very stony silt loam, 12 to 35 percent slopes. Gilpin very stony silt loam, 35 to 60 percent slopes.	3+	1½–3½	1½ to 3½ feet of well-drained, medium-textured, acid soils underlain by interbedded siltstone, sandstone, and shale; the soils generally contain many coarse fragments of sandstone; they are permeable and only slightly plastic.	0–18 18–36
GmD3 GmF GmF3	Gilpin and Montevallo soils, 20 to 35 percent slopes, severely eroded. Gilpin and Montevallo soils, 35 to 60 percent slopes. Gilpin and Montevallo soils, 35 to 60 percent slopes, severely eroded.	3+	1–3	1 to 3 feet of well-drained, acid, channery or shaly soils that developed in material weathered from mixed sandstone, siltstone, and shale.	0–18
GpB2 GpD2	Gilpin-Upshur silty clay loams, 3 to 8 percent slopes, moderately eroded. Gilpin-Upshur silty clay loams, 8 to 25 percent slopes, moderately eroded.	3+	1½–4	1½ to 4 feet of well-drained, moderately fine textured, plastic and sticky soils; extremely variable within a short distance, ranging from typical Gilpin to typical Upshur, which is plastic clay; the information given here is more characteristic of the Upshur soil; see the Gilpin soils for properties of the Gilpin part of the complex.	0–18 18–36

and their estimated properties—Continued

Classification		Percentage passing sieve—			Perme-ability	Available moisture capacity	Reac-tion	Optimum moisture for com-paction	Maximum density (wet)	Shrink-swell potential
Unified [1]	AASHO [2]	No. 4	No. 10	No. 200						
					Inches per hour	*Inches per inch*	*pH*	*Percent*	*Lbs. per cu. ft.*	
ML-CL	A-4, A-6	90-100	85-95	75-85	0. 63-2. 0	0. 17	5. 3	14	136	Medium.
ML-CL	A-4, A-6	75-85	70-80	55-65	0. 2-2. 0	. 13	5. 3	13	134	Medium.
GM-GC	A-2-4, A-4	45-60	40-50	30-35	2. 0-6. 3	. 17	5. 3	13	134	Low.
GM-GC	A-1a, A-2-4	30-40	25-35	15-25	2. 0-6. 3	. 10	5. 3	13	135	Low.
GM	A-1	30-40	25-35	15-25	2. 0-6. 3	. 15	5. 0	13	135	Low.
CL	A-6	85-95	75-85	65-75	0. 2-0. 63	. 17	5. 2	17	130	Medium.
CL	A-6	75-85	65-75	55-65	0. 2-0. 63	. 13	6. 5	17	130	Medium.

See footnotes at end of table.

TABLE 5.—*Brief description of the soils*

Map symbol	Soil	Depth to seasonally high water table	Depth to bed-rock	Description of soil and site	Depth from surface
		Feet	*Feet*		*Inches*
GsA GsB2	Guernsey silty clay loam, 0 to 3 percent slopes. Guernsey silty clay loam, 3 to 8 percent slopes, moderately eroded.	1½	3–5	3 to 5 feet of moderately well drained or somewhat poorly drained silt loam to silty clay loam that developed on shale interbedded with sandstone and some limestone; the water table is seasonally high; the subsoil is moderately plastic and sticky.	0–36 36–48
GuB GuD	Gullied land, 3 to 12 percent slopes.[3] Gullied land, 12 to 35 percent slopes.[3]	3+	1–8	Gullies from 1 to 8 feet deep; soil material generally shaly; sparse vegetation.	--------
HaA HaB HaB2 HaC2	Hartsells loam, 0 to 5 percent slopes. Hartsells loam, 5 to 12 percent slopes. Hartsells loam, 5 to 12 percent slopes, moderately eroded. Hartsells loam, 12 to 20 percent slopes, moderately eroded.	3+	3–6	3 to 6 feet of well-drained, permeable, loamy soils developed on mixed sandstone and siltstone; only slightly sticky when wet.	0–36 36–60
HoA HoB HoC2	Holston silt loam, 0 to 5 percent slopes. Holston silt loam, 5 to 12 percent slopes. Holston silt loam, 12 to 20 percent slopes, moderately eroded.	3+	5–15	5 to 15 feet of well-drained, silty soils that are low in plasticity; below a depth of 3 feet there is some stratification of sand, gravel, and clay.	0–36 36–120
LeB LeD LeF	Leetonia very stony sandy loam, 0 to 12 percent slopes. Leetonia very stony sandy loam, 12 to 35 percent slopes. Leetonia very stony sandy loam, 35 to 80 percent slopes.	3+	2–10	2 to 10 feet of well-drained, coarse-textured, very acid, very stony and bouldery soils; sandstone boulders make up so much of the total acreage that there are only enough fines to fill the voids between the boulders and pebbles.	0–24 24–60
Ma	Made land.[3]	(4)	(4)	Various types of land fill, railroad yards, ball fields, and other areas where soil material has been moved, disturbed, or substantially altered.	--------
Md	Mine dumps.[3]	(4)	(4)	Mixtures of coal, shale, slate, sandstone, and other acid material removed from mines.	--------
MoA MoB	Monongahela silt loam, 0 to 3 percent slopes. Monongahela silt loam, 3 to 8 percent slopes.	1½	5–15	5 to 15 feet of moderately well drained, medium-textured, acid soils that have a compact layer at a depth of about 24 inches; below a depth of 36 inches, there is generally some stratification of sand, gravel, and clay with the dominant silt.	0–24 24–120
MsD2	Montevallo shaly silt loam, 20 to 35 percent slopes, moderately eroded.	3+	1–2	1 to 2 feet of well-drained shaly silt loam over thin-bedded, moderately hard, acid shale.	0–18
MvA MvB2 MvC2	Montevallo-Gilpin shaly silt loams, 0 to 5 percent slopes. Montevallo-Gilpin shaly silt loams, 5 to 12 percent slopes, moderately eroded. Montevallo-Gilpin shaly silt loams, 12 to 20 percent slopes, moderately eroded.	3+	1–3	1 to 3 feet of well-drained, acid, channery or shaly soils developed in material weathered from mixed sandstone, siltstone, and shale.	0–18
NoA NoB NsB	Nolo silt loam, 0 to 3 percent slopes. Nolo silt loam, 3 to 8 percent slopes. Nolo very stony silt loam, 0 to 8 percent slopes.	0	3–5	3 to 5 feet of poorly drained, medium-textured, acid soils that have a moderately developed hardpan generally beginning at a depth of 16 to 20 inches; in many areas there are some sandstone boulders throughout the profile; the water table is high for long periods.	0–24 24–54
Ph	Philo silt loam.	0	3–10	3 to 10 feet of moderately well drained, medium-textured, alluvial soil on the flood plains of streams; subject to occasional flooding by streams.	0–60

and their estimated properties—Continued

Classification		Percentage passing sieve—			Permeability	Available moisture capacity	Reaction	Optimum moisture for compaction	Maximum density (wet)	Shrink-swell potential
Unified [1]	AASHO [2]	No. 4	No. 10	No. 200						
					Inches per hour	*Inches per inch*	*pH*	*Percent*	*Lbs. per cu. ft.*	
ML	A-4	85-95	80-90	75-85	0. 63-6. 3	0. 19	6. 0	17	130	Low.
CL, SC	A-6	65-75	55-65	55-60	<0. 2	. 15	7. 0	17	135	Medium.
----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	
SM, SC	A-4	75-85	70-80	40-50	2. 0 -6. 3	. 19	5. 0	13	135	Low.
SM, SC	A-4	70-80	65-75	35-45	0. 63-2. 0	. 13	5. 2	12	135	Low.
ML	A-4	90-100	85-95	75-85	2. 0 -6. 3	. 19	5. 0	13	130	Low.
ML	A-4	90-100	85-95	75-85	0. 63-6. 3	. 09	5. 0	13	130	Low.
GP-GM	A-1	30-40	25-35	5-15	2. 0-6. 3	. 10	4. 6	12	130	Low.
GP-GM	A-1	20-30	15-25	5-10	2. 0-6. 3	. 10	4. 6	11	135	Low.
----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	
----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	
ML	A-4	90-100	85-95	75-85	0. 63-2. 0	. 19	6. 2	14	135	Low.
ML	A-4	80-90	70-80	60-70	0. 2-2. 0	. 09	6. 4	13	135	Low.
GM-GC	A-1	35-45	25-35	15-25	2. 0-6. 3	. 14	5. 0	13	135	Low.
GM	A-1	35-45	25-35	15-25	2. 0-6. 3	. 15	5. 0	13	135	Low.
CL	A-4	75-85	70-80	55-65	2. 0-6. 3	. 19	5. 0	13	135	Low.
CL	A-4	70-80	65-75	55-65	0. 2-2. 0	. 07	5. 5	12	135	Low.
ML	A-4	85-95	75-85	65-75	0. 63-6. 3	. 17	6. 0	15	125	Low.

See footnotes at end of table.

711-148—64——3

TABLE 5.—*Brief description of the soils*

Map symbol	Soil	Depth to seasonally high water table	Depth to bed-rock	Description of soil and site	Depth from surface
Pp Ps	Pope fine sandy loam. Pope silt loam.	1½	3–10	3 to 10 feet of well-drained, medium or moderately coarse textured soils developed in alluvium on the high parts of flood plains; subject to occasional flooding by streams.	0–60
Pu	Purdy silt loam.	0	3–12	3 to 12 feet of poorly drained, acid silt loam to silty clay, in level to slightly concave areas on old stream terraces that are no longer subject to flooding; the water table is high for long periods; a moderate accumulation of organic matter is in the surface layer.	0–36 36–96
ScA	Sequatchie silt loam, 0 to 5 percent slopes.	3+	4–15	4 to 15 feet of well-drained, medium to moderately fine textured, acid silt loam on nearly level to gently sloping stream terraces that are above the normal overflow level of the stream.	36–96
ShB2	Shelocta silt loam, 3 to 8 percent slopes, moderately eroded.	3+	3–20	3 to 20 feet of well-drained, medium to moderately fine textured, acid silt loam on concave lower slopes and on benches along the sides of valleys.	0–36 36–120
Sm	Strip mines.[3]	([4])	([4])	Extremely deep incisions in hillsides leaving stone escarpments and stony and shaly spoil; generally in areas of Montevallo, Gilpin, Cavode, and Wharton soils.	--------
Ty	Tyler silt loam.	0	3–12	3 to 12 feet of somewhat poorly drained, acid silt to silty clay, on level to moderately sloping, old stream terraces; the subsoil is somewhat plastic and sticky when wet.	0–36 36–72
WnA WnB2 WnC2	Wellston silt loam, 0 to 5 percent slopes. Wellston silt loam, 5 to 12 percent slopes, moderately eroded. Wellston silt loam, 12 to 20 percent slopes, moderately eroded.	3+	3–5	3 to 5 feet of acid, well-drained, medium-textured soil material over interbedded siltstone, sandstone, and shale.	0–18 18–40
WsB2 WsC2 WsD2	Westmoreland silt loam, 5 to 12 percent slopes, moderately eroded. Westmoreland silt loam, 12 to 20 percent slopes, moderately eroded. Westmoreland silt loam, 20 to 35 percent slopes, moderately eroded.	3+	1½–5	1½ to 5 feet of slightly acid or neutral, well-drained, medium to moderately fine textured soil material developed on stratified shale, sandstone, and limestone.	0–18 18–42
WtA	Wharton silt loam, 0 to 3 percent slopes.	1½	3–5	3 to 5 feet of acid, moderately well drained, medium to moderately fine textured soil material developed on clay shale commonly called fire clay.	0–36 36–48
WtB WtB2 WtC2	Wharton silt loam, 3 to 8 percent slopes. Wharton silt loam, 3 to 8 percent slopes, moderately eroded. Wharton silt loam, 8 to 15 percent slopes, moderately eroded.				
ZoA	Zoar silt loam, 0 to 3 percent slopes.	1½	3–12	3 to 12 feet of acid, moderately well drained silty clay loam to silty clay on old stream terraces; the subsoil is moderately plastic and sticky when wet.	0–36 36–48

[1] Unified soil classification system used by the Soil Conservation Service and the Corps of Engineers, U.S. Army.

[2] System of the American Association of State Highway Officials as used by the Pennsylvania Department of Highways and the U.S. Bureau of Public Roads.

and their estimated properties—Continued

Classification		Percentage passing sieve—			Permeability	Available moisture capacity	Reaction	Optimum moisture for compaction	Maximum density (wet)	Shrink-swell potential
Unified [1]	AASHO [2]	No. 4	No. 10	No. 200						
					Inches per hour	*Inches per inch*	*pH*	*Percent*	*Lbs. per cu. ft.*	
ML	A-4	85-95	75-85	55-65	0. 63-6. 3	0. 17	5. 0	15	125	Low.
ML	A-6	90-100	85-95	70-80	<0. 2	. 16	5. 8	17	130	Medium.
ML	A-6	85-95	75-85	70-80	<0. 2	. 09	5. 0	13	130	Medium.
ML	A-4	85-95	80-90	70-80	0. 63-6. 3	. 09	5. 4	13	130	Low.
ML	A-4, A-6	90-100	85-95	75-85	0. 63-2. 0	. 17	5. 3	14	135	Medium.
ML-CL	A-4, A-6	75-85	70-80	55-65	0. 2-2. 0	. 13	5. 3	13	135	Medium.
------	------	------	------	------	------	------	------	------	------	
ML	A-6	90-100	85-95	70-80	0. 2-0. 63	. 17	5. 2	17	130	Medium.
ML	A-6	85-95	75-85	70-80	<0-0. 2	. 09	5. 2	13	130	Medium.
SM	A-4	55-65	45-55	30-35	2. 0-6. 3	. 19	5. 6	13	135	Low.
SM	A-4	45-55	30-40	25-35	2. 0-6. 3	. 13	5. 4	13	135	Low.
SM	A-2, A-4	55-65	45-55	30-35	2. 0-6. 3	. 17	5. 8	13	135	Low.
GM	A-2-4	35-45	30-40	20-30	2. 0-6. 3	. 10	6. 8	13	135	Low.
ML, CL	A-4, A-6	85-95	80-90	70-80	0. 63-6. 3	. 19	5. 0	17	130	Low to medium.
CL	A-4, A-6	65-75	60-70	55-60	0. 2-0. 63	. 13	5. 2	13	130	Medium.
ML	A-4	90-100	85-95	70-80	0. 2-0. 63	. 18	5. 0	17	130	Low.
CL	A-4, A-6	85-95	75-85	70-80	0. 2-0. 63	. 09	5. 2	13	130	Medium.

[3] Too variable to be given a rating for engineering properties. [4] Variable.

TABLE 6.—*Engineering interpretations of soils and*

[Absence of data indicates the soil generally has no

Soil series and mapping symbols	Suitability of material for road fill	Suitability as source of topsoil	Characteristics that affect suitability for— Vertical alinement of highways	Farm ponds: Reservoir area	Farm ponds: Embankment
Atkins silt loam (Aw)	Poor to fair; erodible.	Good	Flooding		
Brinkerton silt loam, very wet (BrA, BrB)	Poor	Fair	High water table		Instability
Brinkerton and Armagh silt loams (BsA, BsB, BvB).	Fair to poor	Fair	Claypan with a high water table.		
Cavode silt loam, silty clay loam, or very stony silt loam (CaA, CaB, CaB2, CaC, CaC2, CaD2, CcC3, CdB, CdD).	Poor above 3 feet; good below.	Fair	Claypan		Instability
Cookport channery loam, loam, or very stony loam (CkA, CkB, CkB2, CkC, CpA, CpB, CpB2, CsB, CsC).	Fair	Good	Dense layer (fragipan).	Rapid permeability above fragipan.	
Dekalb channery loam, loam, or very stony loam (DcA, DcB, DcB2, DcC, DcC2, DcD, DcD2, DcE, DhA, DhB, DhB2, DhC, DhC2, DkB, DkD, DkF).	Good	Fair	Shallowness to bedrock.	Shallowness to bedrock; rapid permeability.	Stoniness
Ernest silt loam or very stony silt loam (EnA, EnB, EnB2, EnC, EnC2, EnC3, ErB, ErC).	Fair	Fair	Claypan		
Gilpin channery silt loam, silt loam, or very stony silt loam (GcA, GcB, GcB2, GcC, GcC2, GcC3, GcD, GcD2, GgA, GgB, GgB2, GgC, GgC2, GgD, GgD2, GlB, GlD, GlF).	Good	Fair	Shallowness to bedrock.	Shallowness to bedrock; rapid permeability.	Rapid permeability.
Gilpin and Montevallo soils (GmD3, GmF, GmF3).	Good	Fair	Shallowness to bedrock.	Shallowness to bedrock; rapid permeability.	Rapid permeability.
Gilpin-Upshur silty clay loams (GpB2, GpD2).	Poor	Poor	Instability; shallowness to bedrock.	Shallowness to bedrock.	
Guernsey silty clay loam (GsA, GsB2)	Poor	Fair	Instability		Instability
Gullied land (GuB, GuD)	Fair	Poor		Rapid permeability	
Hartsells loam (HaA, HaB, HaB2, HaC2)	Good	Good		Rapid permeability	
Holston silt loam (HoA, HoB, HoC2)	Fair	Good		Rapid permeability	
Leetonia very stony sandy loam (LeB, LeD, LeF).	Good	Poor		Shallowness to bedrock; rapid permeability.	Stoniness; rapid permeability.
Mine dumps (Md)	Good	Poor	Variability	Rapid permeability	Rapid permeability; instability.
Monongahela silt loam (MoA, MoB)	Fair	Fair	Dense layer (fragipan).	Rapid permeability	
Montevallo shaly silt loam (MsD2)	Good	Poor	Shallowness to bedrock.	Shallowness to bedrock.	Rapid permeability.
Montevallo-Gilpin shaly silt loams (MvA, MvB2, MvC2).	Good	Fair	Shallowness to bedrock.	Shallowness to bedrock; rapid permeability.	Rapid permeability.
Nolo silt loam or very stony silt loam (NoA, NoB, NsB).	Poor	Fair	High water table		Stoniness
Philo silt loam (Ph)	Poor to fair; erodible.	Good	Flooding		Rapid permeability.
Pope fine sandy loam (Pp)	Poor to fair; erodible.	Good	Flooding	Rapid permeability	Rapid permeability.
Pope silt loam (Ps)	Poor to fair; erodible.	Good	Flooding		Rapid permeability.
Purdy silt loam (Pu)	Poor	Fair	High water table		Instability

features of the soils that affect engineering practices

special characteristics that interfere with the stated use]

Characteristics that affect suitability for—Continued						
Agricultural drainage	Irrigation	Terraces and diversions	Waterways	Building sites	Percolation of septic tank effluent	Pipeline construction and maintenance
Flooding	Poor drainage	Flooding	Wetness	Flooding	Flooding	Flooding.
Slow permeability.	Wetness	---	Wetness	High water table	High water table	High water table.
Slow permeability.	Poor drainage	---	Wetness	High water table	High water table	High water table.
Slow permeability.	Slow infiltration	---	Claypan	Seasonal high water table.	Seasonal high water table.	
---	---	---	---	Seasonal high water table.	Seasonal high water table.	
---	---	---	Stoniness	Shallowness to bedrock.	---	Shallowness to bedrock; stoniness.
---	---	---	---	Seasonal high water table.	Seasonal high water table.	
---	---	---	---	Shallowness to bedrock.	Shallowness to bedrock.	Shallowness to bedrock.
---	Shallowness to bedrock.	Steep slopes	Steep slopes	Steep slopes; shallowness to bedrock.	Steep slopes; shallowness to bedrock.	Shallowness to bedrock.
---	Slow infiltration	---	---	Instability; shallowness to bedrock.	Slow permeability.	Shallowness to bedrock.
Slow permeability.	---	---	---	Instability; seasonal high water table.	Seasonal high water table.	Instability.
---	Rapid permeability.	Irregular surface.	Rough surface	---	---	
---	---	---	---	---	---	
---	---	---	---	---	---	
---	Stoniness	Stoniness	Stoniness	Stoniness; shallowness to bedrock.	Stoniness	Stoniness; shallowness to bedrock.
---	Rapid permeability.	Rapid permeability.	Rapid permeability.	Unsuitable material.	Rapid permeability.	Acidity.
---	---	---	---	Seasonal high water table.	Seasonal high water table.	
---	Shallowness to bedrock.	Shallowness to bedrock.	Shallowness to bedrock.	Shallowness to bedrock.	Shallowness to bedrock.	Shallowness to bedrock.
---	Shallowness to bedrock.	Shallowness to bedrock.	Shallowness to bedrock.	Shallowness to bedrock.	Shallowness to bedrock.	Shallowness to bedrock.
Stoniness; shallowness to pan.	Stoniness and wetness.	---	Stoniness and wetness.	High water table	High water table	High water table.
Flooding	Rapid permeability.	Flooding	---	Flooding	Flooding	Flooding.
---	---	Flooding	Flooding	Flooding	Flooding	Flooding.
---	---	Flooding	Flooding	Flooding	Flooding	Flooding.
Very slow permeability.	Slow infiltration and wetness.	---	Wetness	High water table	High water table	High water table.

TABLE 6.—*Engineering interpretations of soils and features*

Soil series and mapping symbols	Suitability of material for road fill	Suitability as source of topsoil	Characteristics that affect suitability for—		
			Vertical alinement of highways	Farm ponds	
				Reservoir area	Embankment
Sequatchie silt loam (ScA)	Poor to fair, erodible.	Good		Rapid permeability	Rapid permeability.
Shelocta silt loam (ShB2)	Fair	Good		Rapid permeability	
Strip mines (Sm)	Fair	Poor	Instability	Variability of areas	Instability
Tyler silt loam (Ty)	Poor	Fair	Claypan		Instability
Wellston silt loam (WnA, WnB2, WnC2)	Fair	Good		Rapid permeability	
Westmoreland silt loam (WsB2, WsC2, WsD2).	Fair	Good		Rapid permeability	
Wharton silt loam (WtA, WtB, WtB2, WtC2)	Poor	Good	Claypan		Instability
Zoar silt loam (ZoA)	Poor	Fair	Claypan		Instability

Engineering properties of the soils

The soils are listed alphabetically in table 5, and depth to a seasonal high water table and depth to bedrock are indicated. In the column that shows depth from the surface, the layers indicated are fairly typical of the layers in all the soils of any one series. The depths indicated, however, are not identical with those in the representative profile for that particular series, described in the section "Formation, Morphology, and Classification of Soils."

The engineering soil classifications given in table 5 are based on the soil material below a depth of 6 to 10 inches. The soil material above that depth generally contains too much organic matter to be suitable for use in engineering structures. Some of this material may have to be removed and replaced with suitable material.

The permeability of the soil is based on the rate of movement of water through undisturbed soil material. It depends largely upon the texture and structure of the soil.

The available moisture capacity, given in inches per inch of soil depth, is the approximate amount of capillary water in the soil when it is wet to field capacity. When the soil is air dry, this amount of water will wet the soil material described to a depth of 1 inch without deeper percolation.

Shrink-swell potential is an indication of the volume change to be expected with a change in moisture content. It is estimated primarily on the basis of the amount and type of clay present. In general, soils classified as CH and A-7 have high shrink-swell potential. Clean sand and gravel (single-grain structure) and those soils that contain small amounts of nonplastic to slightly plastic fines, as well as most other nonplastic to slightly plastic soil materials, have low shrink-swell potential.

Features affecting engineering

Table 6 gives the engineering interpretations of the soils in the county and the features of the soils that affect engineering practices. The suitability of the soil material for road fill depends largely on the texture of the soil and its natural content of water. Plastic soils that have a high natural content of water are difficult to handle, slow to dry, and hard to compact. Consequently, they are rated poor. Fine sand and silt and other highly erodible soils require flat slopes, close control of moisture while compacting, and fast vegetation of side slopes to prevent erosion. These soils are rated poor to fair.

To determine the suitability of the soils for the vertical alinement of highways, the kinds of material, as well as the drainage, must be considered carefully. If highway cuts are planned at a location where the water table is high, a survey should be made to determine the need for interceptor drains and underdrains. Seepage on the back slopes of cuts may cause slumping or sliding of the underlying material. If the water table is shallow below the pavement, differential volume change may occur, particularly within the freezing zone, and the decrease in bearing capacity of the saturated or thawed foundation material may cause deterioration of the pavement. Commonly the vertical alinement of roads is planned so that a minimum amount of cut and fill is required.

Some soils, particularly those near Mahoning and Little Sandy Creeks, may be flooded occasionally. Roadways constructed on these soils of the flood plains need a continuous embankment to place them above the water table. They generally need to be at a minimum height of 2 to 4 feet. Suitable material for use in these embankments can be taken from the adjacent bottom lands or from the soils of uplands that are adjacent to the flood plains.

Table 6 contains columns that show the most common hazards to look for in locating housing on the various soils. It also shows the limitations of the soils for percolation fields for disposing of septic tank effluent. Construction hazards are a high water table, which results in wet basements; unstable soil material, which does not give solid support; flooding; and, for a few soils, steep slopes. Some soil series contain soils that have a wide *of the soils that affect engineering practices*—Continued

Characteristics that affect suitability for—Continued						
Agricultural drainage	Irrigation	Terraces and diversions	Waterways	Building sites	Percolation of septic tank effluent	Pipeline construction and maintenance
----------	----------	----------	----------	----------	----------	
----------	----------	----------	----------	----------	----------	
Instability.	Slow infiltration.	Instability.	Instability.	Instability.	Slow permeability.	Instability and acidity.
Slow permeability.	Slow permeability.	----------	Claypan.	Seasonal high water table.	Seasonal high water table.	
----------	----------	----------	----------	----------	----------	
----------	----------	----------	----------	----------	----------	
Slow permeability.	Slow infiltration.	----------	Claypan.	Seasonal high water table.	Seasonal high water table.	
Slow permeability.	Slow infiltration.	----------	Claypan.	Seasonal high water table.	Seasonal high water table.	

range of slopes; these soils are good for housing on moderate slopes but poor on the steep slopes. Obstacles to the use of tile distribution fields for disposing of sewage effluent include a high water table, slow soil permeability, flooding, and excessive stoniness.

Descriptions of Soils

This section is for the reader who wants brief nontechnical information about the soils in the county. It describes the soil series and also each soil mapping unit. For each series, a brief description of the color and texture of the soils is given.

Some of the description is accomplished by comparing the profiles of mapping units. These comparisons, as, for example, thickness of the surface layer, are based on the detailed technical description of the profile in the section "Formation, Morphology, and Classification of Soils." Some of the terms used may not be familiar to the reader, and these are defined in the Glossary in the back of the report. Table 7 gives the approximate acreage and proportionate extent of the soils mapped.

TABLE 7.—*Approximate acreage and proportionate extent of soils mapped*

Soil	Acres	Percent	Soil	Acres	Percent
Atkins silt loam	9, 904	2. 4	Cavode very stony silt loam, 8 to 25 percent slopes	949	0. 2
Brinkerton silt loam, very wet, 0 to 3 percent slopes	89	(1)	Cookport channery loam, 0 to 3 percent slopes	522	. 1
Brinkerton silt loam, very wet, 3 to 8 percent slopes	54	(1)	Cookport channery loam, 3 to 8 percent slopes	785	. 2
Brinkerton and Armagh silt loams, 0 to 3 percent slopes	8, 583	2. 1	Cookport channery loam, 3 to 8 percent slopes, moderately eroded	386	. 1
Brinkerton and Armagh silt loams, 3 to 8 percent slopes	10, 651	2. 6	Cookport channery loam, 8 to 15 percent slopes	689	. 2
Brinkerton and Armagh very stony silt loams, 0 to 8 percent slopes	3, 632	. 9	Cookport loam, 0 to 3 percent slopes	1, 742	. 4
Cavode silt loam, 0 to 3 percent slopes	3, 088	. 7	Cookport loam, 3 to 8 percent slopes	2, 577	. 6
Cavode silt loam, 3 to 8 percent slopes	5, 426	1. 3	Cookport loam, 3 to 8 percent slopes, moderately eroded	1, 374	. 3
Cavode silt loam, 3 to 8 percent slopes, moderately eroded	11, 448	2. 7	Cookport very stony loam, 0 to 8 percent slopes	10, 889	2. 6
Cavode silt loam, 8 to 15 percent slopes	2, 748	. 7	Cookport very stony loam, 8 to 15 percent slopes	2, 461	. 6
Cavode silt loam, 8 to 15 percent slopes, moderately eroded	7, 530	1. 8	Dekalb channery loam, 0 to 5 percent slopes	1, 874	. 4
Cavode silt loam, 15 to 25 percent slopes, moderately eroded	503	. 1	Dekalb channery loam, 5 to 12 percent slopes	4, 742	1. 1
Cavode silty clay loam, 8 to 15 percent slopes, severely eroded	400	. 1	Dekalb channery loam, 5 to 12 percent slopes, moderately eroded	2, 985	. 7
Cavode very stony silt loam, 0 to 8 percent slopes	1, 999	. 5	Dekalb channery loam, 12 to 20 percent slopes	3, 148	. 8
			Dekalb channery loam, 12 to 20 percent slopes, moderately eroded	2, 050	. 5
			Dekalb channery loam, 20 to 35 percent slopes	2, 503	. 6
			Dekalb channery loam, 20 to 35 percent slopes, moderately eroded	1, 080	. 3

See footnote at end of table.

TABLE 7.—*Approximate acreage and proportionate extent of soils mapped*—Continued

Soil	Acres	Percent	Soil	Acres	Percent
Dekalb channery loam, 35 to 60 percent slopes	1,170	0.3	Gullied land, 12 to 35 percent slopes	61	(1)
Dekalb loam, 0 to 5 percent slopes	678	.2	Hartsells loam, 0 to 5 percent slopes	1,092	0.3
Dekalb loam, 5 to 12 percent slopes	1,200	.3	Hartsells loam, 5 to 12 percent slopes	725	.2
Dekalb loam, 5 to 12 percent slopes, moderately eroded	995	.2	Hartsells loam, 5 to 12 percent slopes, moderately eroded	759	.2
Dekalb loam, 12 to 20 percent slopes	525	.1	Hartsells loam, 12 to 20 percent slopes, moderately eroded	407	.1
Dekalb loam, 12 to 20 percent slopes, moderately eroded	547	.1	Holston silt loam, 0 to 5 percent slopes	111	(1)
Dekalb very stony loam, 0 to 12 percent slopes	8,868	2.1	Holston silt loam, 5 to 12 percent slopes	250	.1
Dekalb very stony loam, 12 to 35 percent slopes	18,895	4.5	Holston silt loam, 12 to 20 percent slopes, moderately eroded	171	(1)
Dekalb very stony loam, 35 to 100 percent slopes	4,352	1.0	Leetonia very stony sandy loam, 0 to 12 percent slopes	2,419	.6
Ernest silt loam, 0 to 3 percent slopes	1,425	.3	Leetonia very stony sandy loam, 12 to 35 percent slopes	1,045	.3
Ernest silt loam, 3 to 8 percent slopes	11,417	2.7	Leetonia very stony sandy loam, 35 to 80 percent slopes	779	.2
Ernest silt loam, 3 to 8 percent slopes, moderately eroded	20,632	4.9	Made land	635	.1
Ernest silt loam, 8 to 15 percent slopes	4,918	1.2	Mine dumps	282	.1
Ernest silt loam, 8 to 15 percent slopes, moderately eroded	8,360	2.0	Monongahela silt loam, 0 to 3 percent slopes	1,307	.3
Ernest silt loam, 8 to 15 percent slopes, severely eroded	254	.1	Monongahela silt loam, 3 to 8 percent slopes	306	.1
Ernest very stony silt loam, 0 to 8 percent slopes	12,045	2.9	Montevallo shaly silt loam, 20 to 35 percent slopes, moderately eroded	1,648	.4
Ernest very stony silt loam, 8 to 25 percent slopes	8,372	2.0	Montevallo-Gilpin shaly silt loams, 0 to 5 percent slopes	426	.1
Gilpin channery silt loam, 0 to 5 percent slopes	2,403	.6	Montevallo-Gilpin shaly silt loams, 5 to 12 percent slopes, moderately eroded	1,938	.5
Gilpin channery silt loam, 5 to 12 percent slopes	5,704	1.4	Montevallo-Gilpin shaly silt loams, 12 to 20 percent slopes, moderately eroded	2,199	.5
Gilpin channery silt loam, 5 to 12 percent slopes, moderately eroded	10,891	2.6	Nolo silt loam, 0 to 3 percent slopes	581	.1
Gilpin channery silt loam, 12 to 20 percent slopes	9,109	2.2	Nolo silt loam, 3 to 8 percent slopes	437	.1
Gilpin channery silt loam, 12 to 20 percent slopes, moderately eroded	11,720	2.8	Nolo very stony silt loam, 0 to 8 percent slopes	793	.2
Gilpin channery silt loam, 12 to 20 percent slopes, severely eroded	2,284	.5	Philo silt loam	3,741	.9
Gilpin channery silt loam, 20 to 35 percent slopes	9,904	2.4	Pope fine sandy loam	328	.1
Gilpin channery silt loam, 20 to 35 percent slopes, moderately eroded	9,698	2.3	Pope silt loam	247	.1
Gilpin silt loam, 0 to 5 percent slopes	4,453	1.1	Purdy silt loam	1,265	.3
Gilpin silt loam, 5 to 12 percent slopes	5,488	1.3	Sequatchie silt loam, 0 to 5 percent slopes	1,818	.4
Gilpin silt loam, 5 to 12 percent slopes, moderately eroded	18,319	4.4	Shelocta silt loam, 3 to 8 percent slopes, moderately eroded	185	(1)
Gilpin silt loam, 12 to 20 percent slopes	7,959	1.9	Strip mines	11,762	2.8
Gilpin silt loam, 12 to 20 percent slopes, moderately eroded	21,967	5.3	Tyler silt loam	252	.1
Gilpin silt loam, 20 to 35 percent slopes	6,849	1.6	Wellston silt loam, 0 to 5 percent slopes	687	.2
Gilpin silt loam, 20 to 35 percent slopes, moderately eroded	9,644	2.3	Wellston silt loam, 5 to 12 percent slopes, moderately eroded	938	.2
Gilpin very stony silt loam, 0 to 12 percent slopes	2,652	.6	Wellston silt loam, 12 to 20 percent slopes, moderately eroded	211	.1
Gilpin very stony silt loam, 12 to 35 percent slopes	9,686	2.3	Westmoreland silt loam, 5 to 12 percent slopes, moderately eroded	295	.1
Gilpin very stony silt loam, 35 to 60 percent slopes	1,926	.5	Westmoreland silt loam, 12 to 20 percent slopes, moderately eroded	208	(1)
Gilpin and Montevallo soils, 20 to 35 percent slopes, severely eroded	1,451	.3	Westmoreland silt loam, 20 to 35 percent slopes, moderately eroded	49	(1)
Gilpin and Montevallo soils, 35 to 60 percent slopes	5,303	1.3	Wharton silt loam, 0 to 3 percent slopes	991	.2
Gilpin and Montevallo soils, 35 to 60 percent slopes, severely eroded	2,829	.7	Wharton silt loam, 3 to 8 percent slopes	507	.1
Gilpin-Upshur silty clay loams, 3 to 8 percent slopes, moderately eroded	65	(1)	Wharton silt loam, 3 to 8 percent slopes, moderately eroded	1,001	.2
Gilpin-Upshur silty clay loams, 8 to 25 percent slopes, moderately eroded	52	(1)	Wharton silt loam, 8 to 15 percent slopes, moderately eroded	321	.1
Guernsey silty clay loam, 0 to 3 percent slopes	101	(1)	Zoar silt loam, 0 to 3 percent slopes	419	.1
Guernsey silty clay loam, 3 to 8 percent slopes, moderately eroded	1,586	.4	Quarry	37	(1)
Gullied land, 3 to 12 percent slopes	140	(1)	Total	417,280	99.8

[1] Less than 0.05 percent.

Armagh Series

The Armagh series consists of moderately deep or deep, poorly drained soils of the uplands. In fields that have been cultivated, the surface layer is grayish-brown silt loam. The subsoil is brownish silty clay loam that contains gray, brownish-gray, and yellowish-red mottles below a depth of 8 inches. These soils were formed on clay shale of predominantly brownish color. They are nearly level to gently sloping and are on broad flats in the uplands, on gently rounded ridges, and on benches and side slopes.

The Armagh soils are mainly in the southern two-thirds of the county, but some smaller areas are in the northern part. A large part of the acreage is woodland or pasture.

Near or adjacent to the Armagh soils are the somewhat poorly drained Cavode, the moderately well drained Wharton, the somewhat poorly drained or poorly drained Brinkerton, and the well drained Gilpin soils. The Armagh soils generally have a less brownish subsoil than the Cavode and Wharton soils. They have a thinner B horizon and are generally shallower to bedrock than the Brinkerton soils, and they formed on clay shale rather than on colluvium. The Armagh soils commonly occupy nearly level areas downslope from the well-drained, moderately deep Gilpin soils.

The Armagh soils remain wet during much of the growing season because their subsoil is tight silty clay loam or silty clay. They are slowly permeable in the upper part of the profile and very slowly permeable in the lower part. These soils have moderate capacity for storing moisture that plants can use. They are very strongly acid or strongly acid.

In Jefferson County the Armagh soils are closely associated with some of the Brinkerton soils. They need use and management similar to that required for the Brinkerton soils. The Armagh soils have not been mapped separately from those soils but are mapped as undifferentiated Brinkerton and Armagh silt loams and very stony silt loams, and the mapping units are described under the Brinkerton series.

Atkins Series

The Atkins series consists of deep, poorly drained soils on flood plains. The surface layer is very dark grayish-brown silt loam, and the subsoil is gray and light yellowish-brown silt loam. Below a depth of 6 inches, there are mottles of yellowish red and strong brown. These soils were formed in alluvial material weathered from acid sandstone and shale. Weathering and the process of erosion caused soil particles to be washed into streams and later deposited by high water on the banks of the streams.

These nearly level soils occur throughout the county along streams that are subject to flooding. Near or adjacent to them are the well drained Pope and the moderately well drained Philo soils. Mottling appears nearer the surface in the Atkins soils than in the Pope and Philo soils. Also, in wet seasons the water table is nearer the surface in the Atkins soils than in the other soils.

The Atkins soils have a high capacity for storing moisture that plants can use. They are strongly acid or very strongly acid.

Atkins silt loam (Aw).—This is the only Atkins soil mapped in the county. Its slopes range from 0 to 5 percent, but in most places they are between 0 and 2 percent. Water moves through the subsoil at a moderate rate.

Small areas of soils that are better drained than Atkins silt loam are included in the mapped areas of this soil. They are too small to be mapped separately.

Atkins silt loam has limited value for agriculture. Because it is subject to flooding and is naturally wet, it is not particularly well suited to cultivated crops. The soil is poorly suited to small grains. Where it has been cleared and drained, it makes fair pasture and produces fair yields of shallow-rooted crops that withstand some wetness. Pasture plants that tolerate wetness for long periods should be grown. Most of this soil that is not in pasture is grown up to black alder, willow, elderberry, ironwood, hemlock, white pine, and other trees and shrubs. (Capability unit IIIW–2; woodland suitability group 10.)

Brinkerton Series

In the Brinkerton series are deep, somewhat poorly drained or poorly drained soils at the base of slopes. In tilled areas the surface layer is dark grayish-brown silty clay loam. The subsoil, dominantly greenish gray in the upper part and strong brown in the lower part, is mottled throughout with reddish yellow, black, and green. The Brinkerton soils were formed in colluvium derived from acid, gray shale and sandstone. A soil that has a profile considered typical for the series is Brinkerton silt loam, very wet, 0 to 3 percent slopes.

These nearly level and gently sloping soils are widely distributed, but they are most extensive in the southern two-thirds of the county. Most areas are near or adjacent to the moderately well drained Ernest and the well drained Shelocta soils. The Brinkerton soils are less brownish than the Ernest soils, and they have a finer textured, more mottled subsoil closer to the surface.

The Brinkerton soils are slowly permeable. They have a moderate capacity for holding water that plants can use.

Brinkerton silt loam, very wet, 0 to 3 percent slopes (BrA).—In this deep, nearly level soil, the water table is near the surface most of the year. The topography is irregular and ponding is common. During winter and spring, water usually stands on the surface.

In wooded areas a layer of partly decomposed leaves, twigs, and peat moss covers the original mineral soil. The surface layer is very dark gray silt loam, and the subsoil is gray and yellowish-brown silty clay loam with prominent mottles of brownish yellow, strong brown, and light gray. This soil was formed in material weathered from acid, gray shale and sandstone. In most places it is at the heads of streams and in low, concave, wet areas. This soil is slowly permeable to water and air. It is very strongly acid or strongly acid.

This soil is suited to hay or pasture (fig. 7). Open ditches and bedding improve surface drainage, eliminate surface ponding, and lower the water table. Grasses that tolerate wetness ought to be seeded in the pastures, and cattle should not be permitted to graze early in spring or during wet periods. Trees grow poorly on these soils, but hemlock and white pine attain merchantable size. Woodland needs to be protected from fire and grazing. (Capability unit IVw–2; woodland suitability group 10.)

Figure 7.—**Brinkerton silt loam, very wet, 0 to 3 percent slopes, is well suited to pasture if grazing is restricted during wet periods.**

Brinkerton silt loam, very wet, 3 to 8 percent slopes (BrB).—The profile of this soil is similar to that of Brinkerton silt loam, very wet, 0 to 3 percent slopes, but this soil has stronger slopes, and water does not remain on the surface for long periods. The water table is generally 2 to 6 inches lower than that in the less sloping, very wet Brinkerton soil, and the soil dries out at least 2 weeks earlier in spring.

This soil is very strongly acid or strongly acid. It is slowly permeable to water and air.

This soil is suited to hay or pasture. Surface drainage can be improved by installing open ditches and drainage terraces. Pasture grasses that tolerate wetness ought to be planted. Cattle should not be allowed to graze until the soil has had a chance to dry. The soil is essentially poor for woodland, but hemlock and white pine grow to timber size. The forests need to be protected from fire and grazing. (Capability unit IVw–2; woodland suitability group 10.)

Brinkerton and Armagh silt loams, 0 to 3 percent slopes (BsA).—This undifferentiated unit consists of nearly level Brinkerton and Armagh silt loams. It is on broad flats in the uplands and on gently rounded ridges and at the bottom of slopes. Where soil material has accumulated at the base of slopes, these soils are generally deeper than in other areas. These soils are poorly drained or somewhat poorly drained, and in most places they remain wet for long periods. Typical profiles of these soils are described under the Armagh series and the Brinkerton series. Small, eroded areas are included in the mapped areas of this unit.

In spring these soils may become waterlogged. If they are plowed when they are wet, they become cloddy and difficult to work. A tilled crop can be grown occasionally if supplemental drainage is provided, but the soils are better suited to hay, pasture, or trees. Some grasses and legumes can be grown without artificial drainage, but for high yields, drainage, lime, and fertilizer are needed. Open ditches are needed for drainage. The movement of water through the soil is too slow for tile to be fully effective. Most trees, particularly red maple, grow well on these soils. (Capability unit IVw–1; woodland suitability group 10.)

Brinkerton and Armagh silt loams, 3 to 8 percent slopes (BsB).—In this undifferentiated unit the profiles are similar to those in Brinkerton and Armagh silt loams, 0 to 3 percent slopes, but these soils have stronger slopes and are less wet. In many places these soils are shallower to bedrock than Brinkerton and Armagh silt loams, 0 to 3 percent slopes. In the areas that have slopes of 6 to 8 percent, these soils are subject to erosion. In some small areas some of the original surface layer has been removed by erosion.

Cultivated crops can be grown occasionally, but these soils are better suited to hay, pasture grasses, or trees. In tilled areas supplemental drainage and measures to control erosion are needed. Diversion terraces and graded stripcropping can be used effectively for drainage and control of erosion. For highest yields of tilled crops, hay, and pasture grasses, proper amounts of lime and fertilizer need to be added. (Capability unit IVw–1; woodland suitability group 10.)

Brinkerton and Armagh very stony silt loams, 0 to 8 percent slopes (BvB).—The soils in this undifferentiated unit are in pasture and woodland. They have large boulders of sandstone and conglomerate on the surface and in the subsoil. In wooded areas, beneath an organic layer of undecayed and partly decayed leaves and twigs, there is a mineral layer of black silt loam about 2 inches thick. Immediately below this layer, there is a layer of light grayish-brown silt loam, about 6 to 8 inches thick. Except for the large boulders, the profiles of these soils below a depth of about 10 inches are similar to those of Brinkerton silt loam and Armagh silt loam. The Brinkerton soil is generally dominant within this undifferentiated unit.

Because these soils are stony and poorly drained, they are best suited to trees. In places the large boulders interfere with logging equipment to some extent, which makes it difficult to harvest the timber. (Capability unit VIIs–3; woodland suitability group 10.)

Cavode Series

The Cavode soils are moderately deep or deep and are somewhat poorly drained. In cultivated areas that are not severely eroded, the surface layer is dark grayish-brown silt loam. The subsoil is yellowish-brown to strong-brown silty clay loam or silty clay. Grayish mottles occur below a depth of 14 inches, and small, black mottles are in the lower part of the subsoil. These soils were formed on clay shale. A soil that has a profile considered to be typical for the series is Cavode silt loam, 3 to 8 percent slopes, moderately eroded.

The Cavode soils commonly occur on gently sloping ridges, on benches, and on the lower slopes and in flat areas in the uplands. They are nearly level to steep, but in most places they are gently to strongly sloping. These soils are mainly in the southern two-thirds of the county, but small areas occur in other parts.

The Cavode soils are commonly in areas near or adjacent to the Armagh and Wharton soils, and their parent material is similar to the parent material of those soils. The Cavode soils have a more mottled subsoil than the moderately well drained Wharton soils. They lack the dominant grayish color that is typical in the subsoil of the poorly drained Armagh soils.

The subsoil of tight silty clay loam or silty clay and the underlying dense clay shale make the Cavode soils very slowly permeable. Runoff on the sloping soils is rapid, and, therefore, the Cavode are among the most erodible soils in the county. They are generally difficult to work, but they have a moderate capacity for storing moisture that plants can use.

These soils are suited to most of the field crops, pasture plants, and trees that are commonly grown in the county. They are too wet, however, for alfalfa, potatoes, and winter grain. Large amounts of lime and fertilizer are needed for good yields of tilled crops and pasture.

Cavode silt loam, 0 to 3 percent slopes (CaA).—The surface layer of this soil is not noticeably eroded and is about 3 inches thicker than that considered typical for this series. The claypan is 2 to 6 inches nearer the surface, and this soil generally has many seep spots and wet areas. Because it has a fairly tight zone of silty clay in the subsoil and is underlain by shale, this soil is very slowly permeable and has rapid runoff.

Most crops common to the county can be grown on this soil. Open ditches, graded rows, and drainage terraces can be used to help dispose of excess surface water. Tile drainage is effective in eliminating small wet spots and seep areas. Even with supplementary drainage, however, this soil is not suitable for alfalfa and winter small grain. Growing a cover crop and returning crop residues to the soil help maintain organic matter and improve the workability of the surface soil. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIIw-1; woodland suitability group 8.)

Cavode silt loam, 3 to 8 percent slopes (CaB).—The surface layer of this soil is about 3 inches thicker than the one considered typical for this series. Because most of this soil is in trees or has been protected by a good sod, the surface layer is only slightly eroded. The subsoil is very slowly permeable.

Most of the field crops and trees common to the county can be grown on this soil. Graded stripcropping and diversion terraces are needed to protect the soil from excess runoff and erosion. Seep spots can be eliminated by tile drainage. Even with supplementary drainage, however, this soil is not suitable for alfalfa, potatoes, or winter grain. Growing grass and returning crop residues to the soil help maintain organic matter and improve surface tillage. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIIw-3; woodland suitability group 8.)

Cavode silt loam, 3 to 8 percent slopes, moderately eroded (CaB2).—The profile of this soil is considered typical for this series. Erosion has removed 25 to 75 percent of the original surface layer. Water moves slowly through this soil. When nearly saturated, the soil erodes easily. Some areas have numerous fragments of sandstone and shale on the surface.

Most of the field crops and trees common to the county can be grown on this soil. Both erosion control and drainage are needed for good yields of tilled crops and pasture. Diversion terraces and graded stripcropping can be used to protect the soil from excess water and erosion. Tile can be used to drain small, wet spots. Even with supplementary drainage, this soil is not well suited to alfalfa, potatoes, or winter grain. Returning crop residues to the soil helps maintain the content of organic matter in the surface layer. Lime and fertilizer should be added according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIIw-3; woodland suitability group 8.)

Cavode silt loam, 8 to 15 percent slopes (CaC).—This soil has a profile similar to the one considered typical for the series, but the surface layer is 3 to 5 inches thicker. In many places this soil occurs as bands or strips between better drained soils of coarser material. Seep spots are common. Erosion is slight because most of this soil is in trees or has been protected by a good sod. Water moves slowly through this soil.

Some small areas of a more poorly drained soil are included in the mapped areas of this soil.

Cavode silt loam, 8 to 15 percent slopes, is not suited to alfalfa, potatoes, and winter grain. Most other crops common to the county, however, can be grown. Tile drainage is needed to eliminate seep spots. Diversion terraces and stripcropping are needed to remove excess water and to control erosion. Returning crop residues to the soil helps maintain the content of organic matter. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIIe-5; woodland suitability group 9.)

Cavode silt loam, 8 to 15 percent slopes, moderately eroded (CaC2).—The profile of this sloping soil is similar to the one considered typical for the series. This soil is shallower over bedrock, however, and the claypan is 4 to 8 inches nearer the surface. Springs and wet spots are common on hillsides, and the strong slopes are subject to accelerated erosion.

Small areas of poorly drained soils are included in the mapped areas of this soil.

Cavode silt loam, 8 to 15 percent slopes, moderately eroded, is suited to small grains and most hay crops, but alfalfa and other deep-rooted legumes do not grow well, because of the claypan and seasonal waterlogging. Seep spots and wet areas can be eliminated by installing tile. Diversion terraces and stripcropping remove excess surface water and help to control erosion. A long rotation in which row crops are planted no oftener than 1 year in 4 should be used. Growing a cover crop and returning crop residues to the soil provide organic matter and improve workability in the surface layer. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIIe-5; woodland suitability group 9.)

Cavode silt loam, 15 to 25 percent slopes, moderately eroded (CaD2).—This soil occurs as bands on moderately steep slopes where clay shale outcrops. Its profile resembles the profile considered typical for the series, except that its depth is more variable and the surface layer is thinner. The surface layer is about 5 inches thick in most places. Springs and seep areas are common.

Small, wet areas, designated on the map by symbols for wetness, are included in the mapped areas. Also, some areas have fragments of sandstone and shale, about 2 to 5 inches in diameter, on the surface and in the profile.

Cavode silt loam, 15 to 25 percent slopes, moderately eroded, is suitable for long-term hay or pasture. Because the hazard of erosion is high and internal drainage is slow, this soil should be kept in sod and cultivated only when it is necessary to reseed. Lime and fertilizer ought to be applied to increase fertility. Weeds should be mowed in the pastures. (Capability unit IVe–2; woodland suitability group 9.)

Cavode silty clay loam, 8 to 15 percent slopes, severely eroded (CcC3).—The profile of this soil is similar to the one considered typical for the series, except that nearly all of the original silt loam surface layer has been lost through erosion. Shallow gullies have formed in the silty clay subsoil. Runoff is rapid because permeability is poor. Most areas of this soil are below areas of Strip mines, where heavy seepage is present.

Because this soil has poor structure and slow internal drainage, crops are difficult to establish. Close-growing crops, hay, and small grains can be grown. The use of manure and the return of crop residues help to build up the content of organic matter and to improve the workability of the surface soil. Seep spots and springs can be eliminated by tile drainage. Diversion terraces and contour stripcropping control runoff and help to control erosion. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IVe–2; woodland suitability group 9.)

Cavode very stony silt loam, 0 to 8 percent slopes (CdB).—The profile of this soil is like the one considered typical for the series, except that the surface layer is 3 to 6 inches thicker and is generally covered with a black mat of rotted leaves. Numerous boulders, 1 to 10 feet in diameter, are on the surface and throughout the profile.

Nearly all of this soil is in trees. This soil is too stony for normal cultivation, but it can produce satisfactory permanent pasture if it is properly limed and fertilized and is well managed. Much of the acreage is better suited to trees than to pasture. Removing the stones to improve the use of this soil may be economical on some of the better sites. Woodland should be protected from fire and grazing. (Capability unit VIs–2; woodland suitabilty group 8.)

Cavode very stony silt loam, 8 to 25 percent slopes (CdD).—The surface layer of this soil is 2 to 5 inches thicker than the one in the profile considered typical for the series. The upper part of the surface layer is stained very dark grayish brown by organic matter. On the surface there are large boulders, which limit the use of this soil to pasture and trees.

The areas where some of the boulders can be removed economically are satisfactory for pasture. In areas used for pasture, lime and fertilizer ought to be applied to improve fertility, and the weeds should be mowed. Mowing and pasture improvement are difficult where there are many boulders, and such areas are best suited to trees. Woodland should be protected from fire and grazing. (Capability unit VIs–2; woodland suitability group 9.)

Cookport Series

In the Cookport series are moderately deep or deep, moderately well drained soils of the uplands. The upper layers of the mineral soil are yellowish-brown and dark yellowish-brown loam. The subsoil, below a depth of 14 inches, is yellowish-brown and brown clay loam or silty clay loam. The subsoil is the kind called fragipan; it is friable or firm when moist and hard when dry. In wooded areas a loose litter of undecayed leaves and twigs covers the surface. Below the litter is a layer, about 1 inch thick, that consists of black, partly decomposed organic material. The Cookport soils were formed on acid, gray sandstone and shale of the Allegheny Plateau. A soil that has a profile considered typical for the series is Cookport very stony loam, 0 to 8 percent slopes.

These nearly level and gently sloping soils are in the northern one-third of the county. The largest areas are in the vicinity of the Ross Leffler School of Conservation, and others are near the Hays Lot Fire Tower. The Cookport soils are commonly near or adjacent to the well-drained Dekalb and Leetonia and the poorly drained Nolo soils. They are deeper than the Dekalb and Leetonia soils, and their subsoil is more clayey. They have a browner subsoil than the Nolo soils.

The Cookport soils have a moderately permeable surface layer, but they are slowly permeable below a depth of 18 inches. They store a moderate amount of moisture for plants to use. These soils are strongly acid or very strongly acid. Trees generally grow well on them, but they may be subject to fairly extensive damage from windthrow.

Cookport channery loam, 0 to 3 percent slopes (CkA).—This soil has a profile similar to the one considered typical for the series, but small stones, from 2 to 5 inches in diameter, are scattered on the surface and throughout the profile. There are no large boulders on the surface that would interfere with farming operations. This nearly level soil is on benches and plateaus.

Included in the mapped areas of this soil are small areas of a soil that is moderately eroded but that has characteristics similar to those of this channery loam. There are small gullies in the included areas.

Cookport channery loam, 0 to 3 percent slopes, is suited to most of the farm crops, pasture plants, and trees commonly grown in the county. Because internal drainage is slow and the soil remains wet for long periods, alfalfa and winter grains are subject to frost heaving and to winterkill. Graded rows help to dispose of excess surface water. Shallow surface ditches can be used for supplemental drainage. In many places the fragipan is deep enough that tile will work effectively. Grasses and legumes that tolerate some wetness can be used in the cropping system to return organic matter to the soil, to improve the soil structure, and to help control erosion. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIw–1; woodland suitability group 8.)

Cookport channery loam, 3 to 8 percent slopes (CkB).—This soil has a profile similar to the one considered typical for the series, but it does not have large boulders on the surface. Fragments of sandstone, 2 to 5 inches in diameter, are scattered over the surface and throughout the profile. Also, the fragipan is 2 to 3 inches nearer the surface than that in the typical profile.

Most crops commonly grown in the county can be grown on this soil, but alfalfa and winter grains are likely to be winterkilled. Practices that conserve the soil should include graded rows and diversion terraces. These practices help to dispose of water from runoff and help to control erosion. Returning crop residues to the soil and using a rotation in which grass is grown a large part of the time help maintain organic matter in the surface layer and improve the workability of this soil. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIe–2; woodland suitability group 8.)

Cookport channery loam, 3 to 8 percent slopes, moderately eroded (CkB2).—This soil has a profile similar to the one considered typical for the series. It does not have boulders on the surface, however, and 25 to 75 percent of the surface layer has been removed by erosion. Fragments of sandstone, 2 to 5 inches in diameter, are prominent on the surface and in the profile.

Alfalfa and winter grains do not grow well on this soil, because they are subject to frost heaving and winterkill. Most other general farm crops common to the county can be grown. Graded rows and diversion terraces are needed to dispose of excess water and to help control erosion. Returning crop residues to the soil and using a crop rotation in which grass is grown a large part of the time will add organic matter to the surface layer and improve the workability of the soil. Lime and fertilizer ought to be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIe–2; woodland suitability group 8.)

Cookport channery loam, 8 to 15 percent slopes (CkC).—This soil has a profile similar to the one considered typical for the series, but it is strongly sloping and does not have boulders on the surface. Fragments of sandstone, 2 to 5 inches in diameter, are prominent on the surface and in the profile.

Included in the mapped areas of this soil are areas that have moderate erosion or gullies. A few areas of Cookport loam that are in the same slope range are also included in this unit. These areas are too small to be mapped separately.

Cookport channery loam, 8 to 15 percent slopes, is mainly in pasture or trees and has not been exposed to erosion. Most of the general farm crops can be grown on this soil. Alfalfa grows poorly, however, and its yields are low because of frost heaving and winterkill. Contour stripcropping and diversion terraces are needed to remove excess surface water and to control erosion. Returning crop residues to the soil and using a rotation in which grass is grown a large part of the time help to maintain organic matter and to improve the workability of the surface soil. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIIe–2; woodland suitability group 9.)

Cookport loam, 0 to 3 percent slopes (CpA).—This soil has a profile similar to the one considered typical for the series, but it has no boulders or stone fragments on the surface to interfere with farming operations. It is on benches and plateaus.

Small areas of an eroded soil that has characteristics similar to those of this soil are included in the areas mapped. The included soil is moderately eroded and contains small gullies.

Most crops commonly grown in the county grow fairly well on Cookport loam, 0 to 3 percent slopes. Small grains and alfalfa grow poorly, and yields are low because of winterkill. Graded rows and shallow surface drains can be used to dispose of excess surface water. Where the pan layer is deep enough, tile drains work effectively. Returning crop residues to the soil and using a crop rotation in which grass is grown a large part of the time maintain organic matter in the surface layer and improve the workability. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIw–1; woodland suitability group 8.)

Cookport loam, 3 to 8 percent slopes (CpB).—Most of this soil is in trees or has been protected by a good sod. Its surface layer is free of boulders and fragments of stone. The fragipan is 2 to 3 inches nearer the surface than the one in the profile considered typical for the series.

This soil is suitable for birdsfoot trefoil, ladino clover, and most crops commonly grown in the county. Small grains and alfalfa do not grow well, however, because they are subject to damage by winterkill. Graded rows and diversion terraces are needed to dispose of excess surface water and to control erosion. Returning crop residues to the soil and growing grass a large part of the time in the rotation help maintain organic matter and improve the workability of the surface soil. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIe–2; woodland suitability group 8.)

Cookport loam, 3 to 8 percent slopes, moderately eroded (CpB2).—The profile of this soil is similar to the one considered typical for the series, but the surface layer is free of boulders and fragments of stone, and 25 to 75 percent of the surface layer has been lost through erosion.

Included in the mapped areas of this soil are small areas where most of the surface layer has been removed by erosion. In such areas part of the subsoil is turned up when the soil is plowed.

Most crops commonly grown in the county can be grown on Cookport loam, 3 to 8 percent slopes, moderately eroded. Winter grains and deep-rooted legumes are sometimes damaged by winterkill, and then yields are drastically reduced. Graded rows and diversion terraces are needed to remove excess surface water and to help control erosion. Returning crop residues to the soil and growing grass that tolerates wetness help maintain organic matter and improve the workability of the surface soil. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIe–2; woodland suitability group 8.)

Cookport very stony loam, 0 to 8 percent slopes (CsB).—This soil has a profile like the one considered typical for the series. Numerous boulders, 1 to 10 feet in diameter, are on the surface and throughout the profile.

Small, exposed areas that are moderately or severely eroded are included in the mapped areas of this soil.

Cookport very stony loam, 0 to 8 percent slopes, is mainly in trees or pasture. It is too stony for cultivation, but it makes good pasture where the surface stones are not too large or too numerous. Where pastures are needed, the removal of the surface stones may be economical so that machinery can be used to improve the areas to be used for pasture. Trees that grow on this soil are subject to windthrow, and proper cutting practices ought to be used. Woodland should be protected from fire and grazing. (Capability unit VIs–1; woodland suitability group 8.)

Cookport very stony loam, 8 to 15 percent slopes (CsC).—The profile of this soil is similar to the profile considered typical for the series, except that the fragipan is 2 to 7 inches nearer the surface. Numerous boulders, 1 to 10 feet in diameter, are on the surface.

This soil is too stony for cultivation, but it generally makes satisfactory permanent pasture if it is properly limed, fertilized, and well managed. Most of the acreage is in trees or in permanent pasture. Trees grow well, but they are subject to damage by windthrow. Timber harvesting should be done according to proper forestry practices. Woodland ought to be protected from fire and grazing. (Capability unit VIs–1; woodland suitability group 9.)

Dekalb Series

In the Dekalb series are moderately deep or deep, well-drained, loamy or sandy soils of the uplands. In undisturbed areas of woodland, a thin layer of loose leaves and twigs and another layer of black, partly decayed organic matter covers the mineral soil. The upper layer of mineral soil, which is dark yellowish-brown loam, is underlain by a subsoil of yellowish-brown loam. These soils developed on acid sandstone and shale. The profile considered typical for this series is that of Dekalb very stony loam, 12 to 35 percent slopes.

The Dekalb soils range from nearly level to very steep, but most areas are steep and are in trees. Large areas of these soils are in the northern one-third of the county, but there are smaller areas at high elevations in the southern part. Near or adjacent to the Dekalb soils in many places are the moderately well drained Cookport and the well drained Hartsells and Leetonia soils. The Dekalb soils lack the pan layer that is typical in the subsoil of the Cookport soils, and they are generally not so deep as the Hartsells soils. In wooded areas the Dekalb soils commonly have a subsurface layer of dark yellowish brown, rather than one that is grayish like that in the Leetonia soils. Also, the Dekalb soils have a finer textured subsoil than the Leetonia soils.

The Dekalb soils are generally rather coarse textured and have moderately rapid permeability. They are low in water-holding capacity and are somewhat droughty. These soils are strongly acid and are low in natural plant nutrients.

The Dekalb soils that are not too steep or stony are suited to a number of different crops, including potatoes. Because of seasonal droughtiness, they are not suitable for most plants grown for pasture, but birdsfoot trefoil can be grown. About 80 percent of the acreage is woodland, and the rest has been cleared for field crops and pasture.

Dekalb channery loam, 0 to 5 percent slopes (DcA).—The profile of this soil is similar to the one considered typical for the series. It is generally deeper, however, and in places faint mottling is in the subsoil. This soil does not have large boulders on the surface, but numerous fragments of sandstone, which range from 2 to 5 inches in diameter, are on the surface and throughout the profile.

Small areas that are moderately eroded are included in the mapped areas of this soil. Also included are a few small areas where bedrock is at a depth of only 18 inches.

Dekalb channery loam, 0 to 5 percent slopes, is suitable for potatoes and general farm crops. Low natural fertility, acidity, and low moisture capacity are factors that limit yields. Contour stripcropping is necessary to control runoff and erosion. Turning crop residues under as green manure helps to build up and maintain the content of organic matter in the surface layer. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIe–4; woodland suitability group 3.)

Dekalb channery loam, 5 to 12 percent slopes (DcB).—This soil has a profile similar to the one considered typical for the series, but bedrock is generally at a greater depth. In addition, the surface layer is free of boulders, but fragments of sandstone, ranging from 2 to 5 inches in diameter, are scattered on the surface and throughout the profile. In some areas bedrock is at a depth of only 18 inches. In wooded areas the surface is covered with forest litter from hardwoods and with partly decayed leaf mold. This leaf mold is underlain by the mineral soil of dark grayish-brown channery loam, which is loose and friable. This soil erodes rapidly when the protective cover is removed.

Nearly all of this soil is in trees, but small areas are in pasture. This soil is suitable for potatoes and most other farm crops commonly grown in the county. If it is cultivated, it needs the protection of contour stripcropping, diversion terraces, and cover crops. The content of organic matter can be maintained by turning crop residues under as green manure. Lime and fertilizer ought to be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIe–4; woodland suitability group 4.)

Dekalb channery loam, 5 to 12 percent slopes, moderately eroded (DcB2).—The profile of this soil is similar to the one considered typical for the series, except that 25 to 75 percent of the original surface layer has been removed by erosion. This soil does not have large boulders on the surface, but the surface layer and the subsoil contain numerous fragments of sandstone. These fragments range from 2 to 5 inches in diameter. Some small areas are severely eroded. There are also some areas where bedrock is only 18 inches from the surface.

The soil is suited to potatoes and other farm crops. The production of most crops is limited, however, by the low water-holding capacity, acidity, and the shortage of plant nutrients. Contour stripcropping and diversion terraces are needed to control runoff and erosion. Crop residues need to be returned to the soil to maintain the content of organic matter. Apply lime and fertilizer according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIe–4; woodland suitability group 4.)

Dekalb channery loam, 12 to 20 percent slopes (DcC).—The profile of this soil is similar to the one considered typical for the series, except that the surface layer and the subsoil contain numerous fragments of sandstone. These fragments range from 2 to 5 inches in diameter. There are no large boulders on the surface to affect farming operations. In some areas bedrock is at a depth of only 18 inches.

Most of this soil is in trees or is protected by permanent sod. This soil is fairly well suited to many crops, but productivity is affected by the low moisture supply. In areas that are farmed, contour stripcropping, diversion terraces, cover crops, and other practices that protect the soil from runoff and erosion are needed. The content of organic matter can be maintained by returning crop residues to the soil. Add lime and fertilizer according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIIe-4; woodland suitability group 4.)

Dekalb channery loam, 12 to 20 percent slopes, moderately eroded (DcC2).—The profile of this soil resembles the one considered typical for the series, except that the surface layer is 3 to 6 inches thinner and does not contain large boulders. However, numerous fragments of sandstone, 2 to 5 inches in diameter, are on the surface and throughout the profile. About 25 to 75 percent of the surface layer has been lost through erosion.

Included in the mapped areas of this soil are small, severely eroded areas of Dekalb channery loam and Dekalb loam. In these included areas bedrock is generally at a depth of less than 18 inches.

Because of its low water-holding capacity, low natural fertility, and acidity, Dekalb channery loam, 12 to 20 percent slopes, moderately eroded, is limited in productivity. Only fair yields of general farm crops can be expected. Contour stripcropping and diversion terraces are necessary to help prevent erosion and to control runoff. Returning crop residues to the soil helps maintain the content of organic matter in the surface layer. Lime and fertilizer should be added according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIIe-4; woodland suitability group 4.)

Dekalb channery loam, 20 to 35 percent slopes (DcD).—This soil has a profile similar to the one considered typical for the series, but it does not have large boulders on the surface. The surface layer and the subsoil contain numerous fragments of sandstone that range from 2 to 5 inches in diameter. The slopes are moderately steep, and there is a serious hazard of erosion where this soil is cleared.

Small areas of Dekalb loam and of Hartsells loam are included in the mapped areas of this soil. In some areas bedrock is at a depth of only 18 inches.

Because of the strong slopes, areas of Dekalb channery loam, 20 to 35 percent slopes, that have been cleared are generally used for pasture, but an occasional tilled crop can be grown on the lower parts of the slopes. Apply lime and fertilizer to tilled fields and pastures according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit VIe-3; woodland suitability group 6.)

Dekalb channery loam, 20 to 35 percent slopes, moderately eroded (DcD2).—The surface layer of this soil is 3 to 7 inches thinner than the one in the profile considered typical for the series. Numerous fragments of sandstone are on the surface and in the profile. This soil does not have boulders on the surface and has been cleared for farming. Erosion has removed 25 to 75 percent of the original surface layer. Some areas have only a few fragments of sandstone on the surface, and in a few places bedrock is at a depth of only 18 inches.

This soil is better suited to pasture than to tilled crops, but an occasional tilled crop can be grown on the lower parts of the slopes. If this soil is cultivated, it needs the protection of contour stripcropping and diversion terraces. Apply lime and fertilizer according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit VIe-3; woodland suitability group 6.)

Dekalb channery loam, 35 to 60 percent slopes (DcE).—This soil has a profile similar to the one considered typical for the series, but bedrock is nearer the surface. It is free of surface boulders, but numerous fragments of sandstone, 2 to 5 inches in diameter, are on the surface and throughout the profile.

Small areas that are moderately or severely eroded are included in the mapped areas of this soil. In some places in these areas, bedrock is only 18 inches from the surface. Also included are some small areas of Dekalb loam, 35 to 60 percent slopes.

Dekalb channery loam, 35 to 60 percent slopes, is best suited to trees. Trees that require little moisture should be planted when the areas are reforested. The woodland needs to be protected from fire and grazing. (Capability unit VIIe-1; woodland suitability group 7.)

Dekalb loam, 0 to 5 percent slopes (DhA).—The profile of this soil is 4 to 12 inches deeper over bedrock than the one considered typical for the series, but it is free of boulders, and there are no boulders on the surface. This soil occupies nearly flat areas on the tops of ridges and plateaus and on benches on the hillsides.

Some small areas of an excessively drained soil that has a coarser textured subsoil are included in the mapped areas of this soil. Also included are some areas in which the bedrock is only 18 inches from the surface.

Dekalb loam, 0 to 5 percent slopes, is suited to potatoes, small grains, and legumes. Contour stripcropping and diversion terraces are needed to control runoff and erosion. The content of organic matter in the surface layer can be maintained by returning crop residues to the soil. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop. (Capability unit IIe-4; woodland suitability group 3.)

Dekalb loam, 5 to 12 percent slopes (DhB).—The profile of this soil is deeper over bedrock than the one considered typical for the series. In addition, the surface layer is relatively free of boulders and of fragments of sandstone. This soil erodes easily when it is cleared and used for farming. Some small areas are moderately eroded, and, in some, bedrock is at a depth of only 18 inches.

Most of this soil is in trees or has a good cover of grass. This soil is suited to potatoes and other farm crops commonly grown in the county. Because it erodes easily, it needs the protection of stripcropping, diversion terraces, and cover crops if it is used for tilled crops. Turning crop residues under as green manure increases the content of organic matter in the surface layer. Lime and fertilizer should be added according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIe-4; woodland suitability group 4.)

Dekalb loam, 5 to 12 percent slopes, moderately eroded (DhB2).—From 25 to 75 percent of the surface layer of this soil has been lost through erosion. There are no large boulders on the surface, and only a few fragments of sandstone. In some small areas most of the original surface layer has been lost through erosion, and part of the subsoil is now the plow layer. In some of these areas, bedrock is at a depth of only about 18 inches.

Potatoes, small grains, and legumes grow well on this soil. Contour stripcropping, diversion terraces, and other conservation practices are needed to control runoff and erosion. Returning crop residues to the soil improves the content of organic matter in the surface layer. Apply lime and fertilizer according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIe-4; woodland suitability group 4.)

Dekalb loam, 12 to 20 percent slopes (DhC).—This soil is free of surface boulders and can be used for cultivated crops. In a few areas, however, bedrock is at a depth of only about 18 inches. If this soil is cultivated, it erodes rapidly, unless conservation measures are practiced.

This soil is mainly in trees, or, if it has been cleared, it is protected by a good sod. It can be used to grow potatoes, small grains, and legumes with fair results. The soil is somewhat droughty and is low in natural plant nutrients. Contour stripcropping and diversion terraces help protect it from runoff and erosion. Crop residues should be returned to the soil to help maintain the content of organic matter. Applications of lime and fertilizer should be made according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIIe-4; woodland suitability group 4.)

Dekalb loam, 12 to 20 percent slopes, moderately eroded (DhC2).—About 25 to 75 percent of the original surface layer of this soil has been lost through erosion. The soil is free of boulders.

Included in the mapped areas of this soil are small areas of a severely eroded Dekalb loam and of a severely eroded Dekalb channery loam. The included areas have slopes of 12 to 20 percent. Bedrock is at a depth of only about 18 inches.

Most of Dekalb loam, 12 to 20 percent slopes, moderately eroded, is cultivated. Potatoes, small grains, and grass grow well, and yields are fair. Contour stripcropping, diversion terraces, and cover crops are needed to control runoff and erosion. Crop residues ought to be turned under as green manure to provide organic matter. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIIe-4; woodland suitability group 4.)

Dekalb very stony loam, 0 to 12 percent slopes (DkB).—The profile of this soil is similar to the one considered typical for the series, but it is deeper over bedrock in most places and the surface layer is 2 to 6 inches thicker. In places there is faint mottling in the lower part of the subsoil. Bedrock is at a depth of only 18 inches in some areas.

Most of this nearly level, gently sloping soil is in trees, but small, isolated areas are in pasture. The soil is so stony that cultivation is impractical. In less stony areas or in areas where most of the surface stones can be removed economically, it can be used for permanent pasture. Where the soil is used for pasture, weeds should be mowed and lime ought to be applied according to the needs indicated by soil tests. Improving pastures is difficult where boulders are present, and those areas should be planted to trees. Woodland needs to be protected from fire and grazing. (Capability unit VIs-1; woodland suitability group 3.)

Dekalb very stony loam, 12 to 35 percent slopes (DkD).—This soil has a profile like the one considered typical for the series. On its surface are numerous sandstone boulders ranging from 1 to 10 feet in diameter. Small fragments of sandstone are also common on the surface and throughout the profile. The texture of the subsoil ranges from sandy clay loam to sandy loam. In some areas bedrock is at a depth of only about 18 inches.

Because this soil is so steep and stony, it is not well suited to cultivated crops. It is well suited to trees or has limited use for pasture. Trees that grow well on dry sites ought to be planted in areas that are reforested. Timber harvesting needs to be done with care where surface boulders are numerous. Woodland should be protected from fire and grazing. (Capability unit VIs-1; woodland suitability group 4.)

Dekalb very stony loam, 35 to 100 percent slopes (DkF).—The profile of this soil is similar to the one considered typical for the series, but it contains fewer boulders, it is generally shallower over bedrock, and its surface layer is 2 to 5 inches thinner.

Included in the mapped areas of this soil are small areas of a very droughty soil that has a subsoil of coarse sandy loam. Also included are areas where bedrock is at a depth of only 18 inches.

Dekalb very stony loam, 35 to 100 percent slopes, is too steep and stony for cultivated crops or pasture. It is suited to trees and to wildlife. The woodland should be protected from fire. (Capability unit VIIs-2; woodland suitability group 7.)

Ernest Series

The Ernest series is made up of deep, moderately well drained or somewhat poorly drained soils. These soils are nearly level to moderately sloping and are at the base of steep slopes. In tilled fields their surface layer is dark grayish-brown and yellowish-brown silt loam. Their subsoil is brown and yellowish-brown silty clay loam that has mottles of reddish yellow, dark brown, yellowish red, and light gray at a depth of 18 inches or more. These soils were formed in material weathered from acid shale and sandstone. This material moved down from the higher slopes. Ernest silt loam, 0 to 3 percent slopes, has a profile that is considered typical for the series.

The Ernest soils occur throughout the county, but they are mainly in the southern two-thirds. They are on most farms where the Gilpin and Dekalb soils are extensive. The Ernest soils are in areas below the Gilpin and Dekalb soils and are near or adjacent to the poorly drained Brinkerton and the better drained Shelocta soils. They are not so strongly mottled as the Brinkerton soils, and they have brighter colors in their B horizon. They are not so bright colored as the Shelocta soils, and they are mottled nearer the surface.

The Ernest soils are moderately permeable to water and air to a depth of about 20 inches. Below that depth, they have moderately slow or slow permeability. These soils are moderately low in natural plant nutrients, and they have a moderate to high capacity for storing moisture that plants can use. They are slightly acid to very strongly acid.

Ernest silt loam, 0 to 3 percent slopes (EnA).—The profile of this soil is considered typical for the series.

Mapped with this soil in many places are areas of a Shelocta soil that has slopes of 0 to 3 percent. This included soil is better drained than the Ernest soil.

Most crops commonly grown in the county grow well on Ernest silt loam, 0 to 3 percent slopes. To obtain the highest yields, however, it is necessary to control erosion and to improve drainage by diverting runoff from the higher slopes before it can reach this soil. Tile drainage can be used to eliminate seep spots and wet weather springs. Returning crop residues to the soil and using a rotation in which grass is grown a large part of the time will help maintain the content of organic matter and improve the workability of the surface layer. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIw-1; woodland suitability group 8.)

Ernest silt loam, 3 to 8 percent slopes (EnB).—This soil has a profile similar to the one considered typical for the series. Most of it is in trees or is protected by a good sod.

This soil is well suited to most of the crops commonly grown in the county. Where it is cultivated, graded field strips and diversion terraces are used to control runoff and erosion. Tile drainage is needed in some areas to eliminate seep spots and wet weather springs. Returning crop residues to the soil helps maintain the content of organic matter and improves the workability of the surface layer. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIe-2; woodland suitability group 8.)

Ernest silt loam, 3 to 8 percent slopes, moderately eroded (EnB2).—Most of this soil has lost from 25 to 75 percent of the surface layer through erosion. Some small areas are severely eroded.

This soil is well suited to most of the crops commonly grown in the county. Where seep spots and springs are present, tile drainage works well. Graded field strips and diversion terraces are needed to help control runoff and erosion. Using a crop rotation in which grass is grown a large part of the time and returning crop residues to the soil help build up organic matter in the surface layer. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIe-2; woodland suitability group 8.)

Ernest silt loam, 8 to 15 percent slopes (EnC).—The profile of this soil is similar to the one considered typical for the series, except that shale and sandstone are nearer the surface. Most of the acreage is in trees or is protected by a good sod.

Most general farm crops, including corn and alfalfa, grow well on this soil. Where seep spots and springs occur, tile drains can be used successfully. Contour stripcropping and diversion terraces are needed to help control runoff and erosion. Growing grass a large part of the time in the rotation, protecting the soil with a cover crop, and turning under crop residues help to maintain organic matter and improve workability. Lime and fertilizer ought to be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIIe-2; woodland suitability group 9.)

Ernest silt loam, 8 to 15 percent slopes, moderately eroded (EnC2).—The profile of this strongly sloping soil is similar to the one considered typical for the series, except that it is shallower. The A horizon is 2 to 5 inches thinner. About 25 to 75 percent of the surface layer has been lost through erosion.

This soil is suited to most of the farm crops commonly grown in the county. Diversion terraces and contour stripcropping are necessary to help control runoff and erosion. Growing a cover crop, returning crop residues to the soil, and growing grass a large part of the time in the rotation help to build up the content of organic matter and to improve the workability of the surface layer. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIIe-2; woodland suitability group 9.)

Ernest silt loam, 8 to 15 percent slopes, severely eroded (EnC3).—The profile of this soil is shallower over bedrock than the one considered typical for the series. More than 75 percent of the surface layer has been lost through erosion, and material that was formerly in the subsoil makes up a large part of the plow layer. Shallow gullies have cut into the subsoil, and runoff is rapid because permeability is slow.

Crops are difficult to establish, and yields of most crops are poor. Using a long rotation in which grass is grown a large part of the time and returning crop residues to the soil help build up the content of organic matter and improve the workability of the surface layer. Diversion terraces and contour stripcropping help control runoff and erosion. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IVe-2; woodland suitability group 9.)

Ernest very stony silt loam, 0 to 8 percent slopes (ErB).—This soil has a profile similar to the one considered typical for the series. However, large boulders, 2 to 10 feet in diameter, are on the surface and in the profile.

Most of this soil is in trees or permanent pasture. This soil is generally too stony for cultivated crops. It can produce satisfactory permanent pasture if it is properly limed and fertilized and is otherwise well managed. In places where there are many stones on the surface, the soil may be better suited to trees. Woodland should be protected from fire and grazing. (Capability unit VIs-1; woodland suitability group 8.)

Ernest very stony silt loam, 8 to 25 percent slopes (ErC).—This soil has a profile similar to the one considered typical for the series, but boulders large enough to interfere with farming operations are on the surface and in the profile. The upper part of the surface layer is stained very dark grayish brown by organic matter.

Most of the acreage is in trees or permanent pasture. Where removing the surface stones is practical, this soil can be used satisfactorily for pastures. The fertility of the pastures needs to be improved by applying lime and fertilizer. In addition, weeds should be mowed. In areas where boulders are excessive, pastures are difficult to manage, and those areas are better used for trees. The forests should be protected from fire and grazing. (Capability unit VIs-1; woodland suitability group 9.)

Gilpin Series

Shallow to moderately deep, well-drained soils of the uplands make up the Gilpin series. In tilled fields the surface layer is dark-brown silt loam and the subsoil is yellowish-brown silty clay loam. These soils were formed in material weathered from yellowish or olive-colored shale, siltstone, and sandstone. A profile that is considered typical for this series is that of Gilpin silt loam, 12 to 20 percent slopes, moderately eroded.

The Gilpin soils are mainly in the southern two-thirds of the county, but some small areas are in the northern part. These soils are in nearly level areas and in rolling areas on ridgetops and plateaus. They are also on benches and side slopes that range from gently sloping to very steep. Most of the acreage, however, is strongly sloping or moderately steep.

These are the most extensive soils in the county. They are most extensive near or adjacent to the well drained Wellston and Montevallo, the moderately well-drained Wharton, and the somewhat poorly drained Cavode soils. The Gilpin soils are shallower than the Wellston soils and are slightly thicker than the Montevallo soils. They have a thinner subsoil than the Wharton soils, and they lack the blocky structure and mottled, clayey subsoil that is typical of the Cavode soils.

The Gilpin soils have moderately rapid permeability and moderate water-holding capacity. They are very strongly acid to medium acid and have moderate natural fertility. Crops grown on them respond well to large applications of lime and fertilizer. In areas that are not too steep, these soils are suited to all the farm crops grown in the county.

Gilpin channery silt loam, 0 to 5 percent slopes (GcA).—This nearly level soil is on the tops of hills and on benches. Its profile is 4 to 10 inches deeper than the one considered typical for the series. Fragments of stone, 2 to 6 inches in diameter, are on the surface and throughout the profile. The surface layer is darker than the one in the typical profile, and it contains more organic matter.

Included in the mapped areas of this soil are some small areas in which there is faint mottling at a depth of about 16 inches. The mottled areas are in local seep spots and in depressions where the water table is close to the surface. Also included are small areas near Knox Dale where the soil has a coarse-textured subsoil. In other included areas north of Sykesville, there are many fragments of stones on the surface.

Gilpin channery silt loam, 0 to 5 percent slopes, is mainly in pasture or trees, which protect it from erosion. It produces good yields of alfalfa, small grains, row crops, and hay. Most of the crops commonly grown in the county grow well on this soil. Random tile drains are needed in some spots where water concentrates or seeps out of the underlying rocks. Contour stripcropping and diversion terraces are needed to control runoff and erosion. Growing grass a large part of the time in the cropping system and returning crop residues to the soil help to maintain the content of organic matter in the surface layer. Lime and fertilizer ought to be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIs–1; woodland suitability group 3.)

Gilpin channery silt loam, 5 to 12 percent slopes (GcB).—The profile of this soil is 2 to 10 inches deeper than the one considered typical for the series. Because this soil is not eroded, its surface layer is also thicker and darker colored than the one in the profile considered typical. It contains fragments of coarse sandstone and shale 2 to 6 inches in diameter and 1 to 2 inches thick. Some small areas near springs or seep spots are mottled.

This soil is mainly in trees or is protected by a good sod. It is suited to alfalfa and to most of the other crops commonly grown in the county. Random tile drains are needed to eliminate seep spots. Contour stripcropping and diversion terraces are needed to reduce runoff and to control erosion. Growing grass a large part of the time in the cropping system and returning crop residues to the soil help to maintain organic matter in the surface layer. Lime and fertilizer ought to be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIe–3; woodland suitability group 4.)

Gilpin channery silt loam, 5 to 12 percent slopes, moderately eroded (GcB2).—The profile of this soil is 3 to 7 inches deeper than the one considered typical for this series. There are numerous fragments of sandstone and shale, ranging from 2 to 6 inches in diameter and from 1 to 2 inches in thickness, on the surface and throughout the profile. Springs are common in the areas, and, where seep spots occur, faint mottling appears in some places in the lower part of the subsoil. The plow layer consists of a mixture of material from the surface layer and from the subsoil.

This soil produces good yields of alfalfa and small grains, and it is suited to most of the crops commonly grown in the county. Seep spots can be eliminated by tile drainage. Contour stripcropping and diversion terraces reduce runoff and help to control erosion. Growing grass a large part of the time in the cropping system and returning crop residues to the soil help to maintain organic matter and improve the water-holding capacity of the surface layer. Lime and fertilizer ought to be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIe–3; woodland suitability group 4.)

Gilpin channery silt loam, 12 to 20 percent slopes (GcC).—This soil has a profile similar to the one considered typical for the series. The surface layer is darker colored and 3 to 6 inches thicker, however, and it contains more organic matter. There are numerous fragments of sandstone and shale on the surface and in the profile.

This soil is mainly in trees or is protected by permanent sod. It is suited to alfalfa, small grains, and most of the other crops commonly grown in the county. Seep spots and springs can be eliminated by random tile drains. Diversion terraces and contour stripcropping are needed to protect the soil from runoff and erosion. Using a good rotation and returning crop residues to the soil help to maintain organic matter in the surface layer. Lime and fertilizer ought to be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIIe–3; woodland suitability group 4.)

Gilpin channery silt loam, 12 to 20 percent slopes, moderately eroded (GcC2).—This soil has numerous fragments of sandstone and shale on the surface and throughout the profile. From 25 to 75 percent of the original surface layer has been lost through erosion. Springs and seep spots are common, and near some of these wet areas the subsoil is faintly mottled.

Most crops commonly grown in the county, including alfalfa and small grains, grow well on this soil. Contour stripcropping and diversion terraces are needed to control runoff and erosion. Returning crop residues to the soil helps to maintain organic matter in the surface layer. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIIe–3; woodland suitability group 4.)

Gilpin channery silt loam, 12 to 20 percent slopes, severely eroded (GcC3).—More than 75 percent of the surface layer of this soil has been lost through erosion, and much of the plow layer is material that was formerly part of the subsoil. There are numerous fragments of sandstone and shale on the surface and in the profile. Small gullies that were cut into the subsoil as the result of heavy rains are common.

Some small areas that do not have fragments of sandstone and shale on the surface or in the profile are included in the mapped areas of this soil. Also included are areas of a severely eroded soil that has a slightly finer textured subsoil than the one in the profile considered typical.

Gilpin channery silt loam, 12 to 20 percent slopes, severely eroded, is poorly suited to most crops, but fair yields of birdsfoot trefoil can be obtained under good management. This soil is suitable for hay, pasture, or trees. If hay is grown and is reseeded every few years, contour stripcropping and diversion terraces are needed to reduce further erosion. Where the soil is used for pasture, its fertility needs to be kept up and grazing should be regulated so that a good cover of sod is maintained. (Capability unit IVe–3; woodland suitability group 4.)

Gilpin channery silt loam, 20 to 35 percent slopes (GcD).—The surface layer of this soil is 2 to 6 inches thicker than the one in the profile considered typical for the series. Numerous fragments of sandstone and shale are on the surface and in the profile. The profile is generally slightly shallower than the one considered typical.

Most of this soil is in trees or has the protection of a good sod. Because its slopes are moderately steep, the soil is probably best suited to pasture or hay grown for a long period. Diversion terraces are necessary to control runoff and to help prevent erosion. Pasture needs to be limed and fertilized according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit VIe–2; woodland suitability group 6.)

Gilpin channery silt loam, 20 to 35 percent slopes, moderately eroded (GcD2).—This soil is steeper and shallower over bedrock than the one that has a profile considered typical for the series. It has fragments of stone, 2 to 6 inches in diameter, on the surface and throughout the profile. Most of the acreage is steep and is on cleared hillsides, where 25 to 75 percent of the original surface layer has been lost through erosion. In some small areas near seep spots, the lower part of the subsoil is faintly mottled, and in other areas it is more sandy than that in the typical profile.

Because it is so steep, this soil is probably best suited to pasture (fig. 8) or hay grown for a long period. The lower parts of the slopes are suited to hay grown in a rotation of low intensity. Diversion terraces are needed to reduce runoff and to control erosion. Pasture ought to be limed according to the needs indicated by soil tests. Trees that do not require considerable moisture are adapted to this site. (Capability unit VIe–2; woodland suitability group 6.)

***Figure 8.*—Permanent pasture on Gilpin channery silt loam, 20 to 35 percent slopes, moderately eroded. The soils in the foreground are Cavode silt loams.**

Gilpin silt loam, 0 to 5 percent slopes (GgA).—This nearly level soil is on the tops of hills and on benches. Its surface layer is 2 to 6 inches thicker than the one in the profile considered typical for the series, and it is darker because it contains more organic matter. In depressions and near small seep areas, the subsoil is finer textured than the one in the profile considered typical, and there are a few faint mottles in places.

Most crops commonly grown in the county, including alfalfa and corn, grow well on this soil. Where seep spots or springs appear, random tile drains are effective. Conservation practices ought to include a rotation of medium intensity, contour stripcropping, and diversion terraces that will help control runoff and erosion. Returning crop residues to the soil helps to maintain organic matter in the surface layer. Crops grown on this soil respond well if lime and fertilizer are added. The lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIs–1; woodland suitability group 3.)

Gilpin silt loam, 5 to 12 percent slopes (GgB).—The profile of this soil is similar to the one considered typical for the series. The surface layer, however, is darker and it is about 2 to 4 inches thicker because this soil has not been exposed to erosion. In areas near springs or seep spots, there may be faint mottling in the lower part of the subsoil.

Most of this soil is in trees or is protected by a good sod. In areas used for field crops, however, most crops commonly grown in the county grow well. Seep spots can be eliminated by tile drainage. Diversion terraces and stripcropping help to control runoff and erosion. The content of organic matter can be maintained by returning crop residues to the soil. Lime and fertilizer should be added according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIe–3; woodland suitability group 4.)

Gilpin silt loam, 5 to 12 percent slopes, moderately eroded (GgB2).—The profile of this soil is generally 2 to 8 inches deeper than the one considered typical for the series. From 25 to 75 percent of the original surface layer has been lost through erosion.

This soil has been cleared and is used for farming. It is suited to alfalfa, small grains, and most of the other crops commonly grown in the county. Contour stripcropping and diversion terraces are needed to give protection from erosion. Using a proper rotation and returning crop residues to the soil help to maintain organic matter in the surface layer. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIe-3; woodland suitability group 4.)

Gilpin silt loam, 12 to 20 percent slopes (GgC).—The surface layer of this soil is darker and is about 2 to 6 inches thicker than the one in the profile considered typical for the series. This strongly sloping soil is on hillsides.

This soil is mainly in trees or in areas protected by a good sod. It can be used for most of the crops commonly grown in the county, including corn and alfalfa. Seep spots can be eliminated by installing tile drains. Contour stripcropping and diversion terraces reduce runoff and help to control erosion. Growing grass a large part of the time in the cropping system and returning crop residues to the soil help to maintain organic matter in the surface layer. Lime and fertilizer ought to be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIIe-3; woodland suitability group 4.)

Gilpin silt loam, 12 to 20 percent slopes, moderately eroded (GgC2).—The profile of this soil is considered typical for the series. The soil is strongly sloping, but it has been cleared for farming. Because this soil did not have continuous protection against erosion, about 25 to 75 percent of the original surface layer has been washed away.

Most crops common to the county can be grown on this soil, but the shallow-rooted crops grow best. The protection provided by contour stripcropping and diversion terraces is needed to reduce runoff and to help prevent erosion. A proper rotation and returning crop residues to the soil help to build up and maintain organic matter in the surface layer. Lime and fertilizer ought to be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIIe-3; woodland suitability group 4.)

Gilpin silt loam, 20 to 35 percent slopes (GgD).—The surface layer of this soil contains more organic matter than that in the profile considered typical for the series, and it is slightly thicker and darker. The subsoil is also generally thinner than that in the typical profile.

Some small areas of a deeper soil that has the same slope range are included in the mapped areas of this soil.

Most of Gilpin silt loam, 20 to 35 percent slopes, is in trees or pasture and has not been exposed to erosion. Pasture and hay grown for long periods are practical uses. Such conservation measures as diversion terraces and a cover of grass are necessary when farming this soil. The pastures ought to be limed and fertilized according to the needs indicated by soil tests. (Capability unit VIe-2; woodland suitability group 6.)

Gilpin silt loam, 20 to 35 percent slopes, moderately eroded (GgD2).—The subsoil of this soil is generally 4 to 6 inches thinner than the one in the profile considered typical for the series. Because this soil has been cleared and farmed, erosion has washed away 25 to 75 percent of the surface layer.

Small areas of a soil that has a deeper profile but that has the same slope range are included in the mapped areas of this soil.

Gilpin silt loam, 20 to 35 percent slopes, moderately eroded, is too steep for intensive cropping. The slopes in some places are moderate enough, however, for growing hay crops in a long rotation. Diversion terraces are needed to control runoff, and a good cover of grass will protect the soil from erosion during heavy rains. The pastures ought to be limed and fertilized according to the needs indicated by soil tests. (Capability unit VIe-2; woodland suitability group 6.)

Gilpin very stony silt loam, 0 to 12 percent slopes (GlB).—The surface layer of this soil is darker than the one in the profile considered typical for the series, and it is 3 to 7 inches thicker. There are many sandstone boulders on the surface and in the profile. In some small areas faint mottling appears in the lower part of the subsoil, just above the bedrock. Also, some small areas are moderately eroded or gullied.

This nearly level to gently sloping soil is in pasture and trees. It is too stony for cultivation. Where stones are not too large or numerous, this soil makes good pasture. Pasture improvement is difficult where there are many large boulders; therefore, such areas should be planted to trees. The pastures should have fertilizer applied according to the needs indicated by soil tests. Many different kinds of trees grow well on this soil. The wooded areas need protection from fire and grazing. (Capability unit VIs-1; woodland suitability group 3.)

Gilpin very stony silt loam, 12 to 35 percent slopes (GlD).—The surface layer of this soil is darker and is 2 to 5 inches thicker than the one in the profile considered typical for the series. There are many sandstone boulders 1 to 10 feet in diameter on the surface and in the profile. Some small, stony areas are moderately eroded.

Pasture and woodland are probably the best uses for this soil. The lower parts of the slopes and the areas where boulders are not so numerous are suitable for pasture. Pasture renovation is difficult where boulders are present and the slopes are the steepest, but limited improvement can be done without using machinery. The wooded areas need to be protected from fire and grazing. (Capability unit VIs-1; woodland suitability group 4.)

Gilpin very stony silt loam, 35 to 60 percent slopes (GlF).—The profile of this soil resembles the one considered typical for the series, but sandstone and shale are nearer the surface. Also, the surface layer is covered with leaf litter, and there are large boulders on the surface.

This soil is too steep and stony for cultivated crops or pasture, and all of it is in trees. It is suitable for trees and for wildlife and recreation. The wooded areas ought to be protected from fire. (Capability unit VIIs-2; woodland suitability group 7.)

Gilpin and Montevallo soils, 20 to 35 percent slopes, severely eroded (GmD3).—In this undifferentiated unit are severely eroded areas of Gilpin silt loam, Gilpin channery silt loam, and Montevallo shaly silt loam. In addition, there are small areas of a moderately steep Wellston silt loam. The soils of this unit are well drained and are very shallow in places. Nearly all of the surface layer has been washed away, and visible gullies have been cut into the subsoil. Where these soils are 12 inches deep or deeper, the subsoil is generally more clayey than that in the shallower soils.

These soils are best used for pasture or trees. Trees will grow on them, but timber production is generally poor. Evergreens can be planted for Christmas trees. They protect the soils from further erosion, build up organic matter, and provide short-term income. The wooded areas need to be protected from fire and grazing. (Capability unit VIIe-2; woodland suitability group 13.)

Gilpin and Montevallo soils, 35 to 60 percent slopes (GmF).—The soils of this undifferentiated unit are similar to Gilpin and Montevallo soils, 20 to 35 percent slopes, severely eroded, except that they are steeper and are not eroded to the extent that gullies have cut into the subsoil. The depth of the profile varies greatly. The soils that have the deepest profile have a more definite structure and more clay in the subsoil than the ones that have a shallower profile.

These soils are mainly in trees, and, therefore, they are protected from heavy rains. Because they are steep and shallow, the soils are best suited to trees. Pulpwood and chemical wood can be harvested, but in most places these soils are poor for timber production. The wooded areas ought to be protected from fire and grazing. (Capability unit VIIe-2; woodland suitability group 13.)

Gilpin and Montevallo soils, 35 to 60 percent slopes, severely eroded (GmF3).—These soils are similar to Gilpin and Montevallo soils, 20 to 35 percent slopes, severely eroded, except that their profile is generally thinner and the slopes are steeper. In places shale bedrock is at a depth of only a few inches, and it is exposed where gullies are prevalent. Nearly all the surface layer and some of the subsoil have been washed away, and noticeable gullies were left. Vegetation is generally sparse on these soils.

These soils are probably best used for wildlife or for trees. Reforestation should favor trees that will grow on shallow soils and dry sites. Timber production is poor, but pulpwood and chemical wood can be harvested. The wooded areas ought to be protected from fire and grazing. (Capability unit VIIe-2; woodland suitability group 13.)

Gilpin-Upshur silty clay loams, 3 to 8 percent slopes, moderately eroded (GpB2).—This complex contains Gilpin silt loam and Gilpin channery silt loam, mingled with streaks of Upshur soils. Typical profiles of both Gilpin and Upshur soils can be seen. Where the two soils adjoin, however, the properties of both are apparent in a single profile, and the reddish color of the Upshur soil is outstanding. Most of this complex is in the southwestern part of the county, but the largest acreage is south of Sykesville. Some areas are more nearly level than the typical soils in the complex, and some are severely eroded.

Alfalfa and most of the other crops commonly grown in the county can be grown on these soils. Contour stripcropping and diversion terraces need to be used to control runoff and to help prevent erosion. These soils are difficult to plow during wet seasons, and they should not be worked until they have had a chance to dry. Growing a cover crop and returning crop residues to the soils help to restore and maintain the content of organic matter in the surface layer. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIIe-1; woodland suitability group 3.)

Gilpin-Upshur silty clay loams, 8 to 25 percent slopes, moderately eroded (GpD2).—The soils in this complex are shallower than those in Gilpin-Upshur silty clay loams, 3 to 8 percent slopes, moderately eroded. They are also more strongly sloping, and a few areas are moderately steep. Some areas are severely eroded and contain small gullies that have cut into the subsoil.

Most of the acreage in this complex has been cleared for farming, but a few small areas are in trees and are therefore not subject to erosion. Alfalfa, clover, and most of the other crops commonly grown in the county can be grown on these soils. Contour stripcropping and diversion terraces are necessary to give protection from erosion and to control runoff. Plowing should be delayed if the soils are wet; otherwise, clodding will result. Returning crop residues to the soils helps maintain the content of organic matter and makes the soil easier to work. Apply lime and fertilizer according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IVe-1; woodland suitability group 4.)

Guernsey Series

The Guernsey series is made up of moderately deep or deep, moderately well drained or somewhat poorly drained soils of the uplands. These soils have been strongly influenced by limestone. Seep spots are common on hillsides and on the lower parts of slopes. In tilled fields the surface layer is dark-brown to dark yellowish-brown silty clay loam. The subsoil is gray silty clay with mottles of strong brown at a depth of 16 inches. These soils were formed on interstratified limestone, limy shale, and acid sandstone and shale, but in most places they are underlain by Vanport limestone. The profile of Guernsey silty clay loam, 3 to 8 percent slopes, moderately eroded, is considered typical for the series.

These nearly level to moderately sloping soils are on ridgetops and benches near Sugar Hill and Munderf, in the northeastern part of the county. They are also in the southwestern part, from Baxter south to Timblin and Punxsutawney. The Guernsey soils are near or adjacent to the well-drained Gilpin and Westmoreland soils. They have a less brownish subsoil than the Westmoreland soils, and they are deeper, more clayey, and contain fewer shale fragments than the Gilpin soils.

The Guernsey soils produce good pastures of bluegrass and above-average yields of grass-and-legume hay and row crops. Most crops commonly grown in the county can be grown on these soils.

Guernsey silty clay loam, 0 to 3 percent slopes (GsA).—The profile of this soil is 4 to 6 inches deeper than the one considered typical for the series, and mottling is nearer the surface. Water moves slowly through the surface layer and very slowly through the subsoil. This soil has a moderate capacity for storing moisture that plants can use.

Alfalfa is suitable for this soil, but it may be subject to winterkill in the somewhat poorly drained areas. Tile drains are needed in some spots where water concentrates or seeps out of the underlying rocks. Where this soil is cultivated, graded field strips and diversion terraces are used to control runoff and erosion. Using a crop rotation in which grass is grown a large part of the time and returning crop residues to the soil help to maintain the content of organic matter and to improve the workability of the surface layer. Lime and fertilizer ought to be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIw-1; woodland suitability group 8.)

Guernsey silty clay loam, 3 to 8 percent slopes, moderately eroded (GsB2).—This soil has a profile considered typical for the series. In many places the soil occurs as bands or benches on hillsides.

Included in the mapped areas are small, wet or seep areas. Also included are a few small areas that were dug over when limestone was removed for use on the farm.

Guernsey silty clay loam, 3 to 8 percent slopes, moderately eroded, produces fair to good yields of alfalfa, but some winterkill is common on the wet spots. The soil is suited to row crops and is well suited to bluegrass pasture. Graded field strips and diversion terraces are used to help control erosion and runoff on the cultivated areas. Growing grass and legumes in the crop rotation helps to maintain the content of organic matter and makes the soil easier to work. Lime and fertilizer are needed if most of the adapted crops are to be grown. (Capability unit IIe-2; woodland suitability group 8.)

Gullied Land

This miscellaneous land type is in local areas in the county. It occurs where coke ovens were once operated. The coke ovens were generally in valleys near Punxsutawney. Escaping gases from the ovens had a toxic effect on the vegetation and killed much of it. After the vegetation was killed, the exposed hillsides were subject to accelerated erosion, and deep gullies formed. Two units of this land type, which are differentiated by slope, were mapped in the county.

Gullied land, 3 to 12 percent slopes (GuB).—This land type lies immediately below Gullied land, 12 to 35 percent slopes. Some natural vegetation, such as birch, aspen, huckleberries, dewberries, moss, and grass, grew up on part of the acreage after the coke ovens were no longer operated. At present the best use of these areas is probably for growing trees, or the land can be reclaimed for urban expansion. (Capability unit VIIIs-2; woodland suitability group 13.)

Gullied land, 12 to 35 percent slopes (GuD).—This land type is similar to Gullied land, 3 to 12 percent slopes, except that it is steeper and contains more shale chips and less clay. Gullies from 1 to 8 feet deep penetrate the shaly bedrock and have caused most of the soil material to be removed.

Volunteer vegetation, consisting of aspen, birch, huckleberries, dewberries, and grass, has started to grow on these areas. The land can be brought back to partial production by restoring a cover of vegetation that will increase the content of organic matter. This, however, would be an expensive operation. Probably, the best use of these areas is for trees. The vegetation responds well to heavy applications of lime and fertilizer. (Capability unit VIIIs-2; woodland suitability group 13.)

Hartsells Series

Deep, well-drained soils of the uplands make up the Hartsells series. Small, grayish fragments of sandstone are common throughout their profile. In cultivated fields the surface layer is dark grayish-brown or dark-brown loam. In wooded areas a grayish layer, ½ inch to 3 inches thick, lies just below the layer of organic matter. The subsoil is yellowish-brown silty clay loam. These soils were formed in material weathered from acid, gray sandstone and shale. Hartsells loam, 5 to 12 percent slopes, moderately eroded, has a profile considered typical for the series.

The most extensive areas of these soils are in the northern one-third of the county and at high elevations in the southern part. The soils are on broad, nearly level uplands and on strongly sloping hillsides. They range from nearly level to strongly sloping, but in most areas they are gently sloping.

Near or adjacent to these soils are the well drained Dekalb and the moderately well drained Cookport soils. The Hartsells soils are deeper than the Dekalb soils, and they have a finer textured subsoil. They lack the pan layer and mottling in the subsoil that are typical of the Cookport soils.

Water and air move through the Hartsells soils at a moderate rate, but the moisture-holding capacity is high. These soils are strongly acid or very strongly acid.

Most crops commonly grown in the county can be grown on these soils with good results, but the soils are particularly well suited to potatoes. The soils are thoroughly leached, however, and they must have plant nutrients supplied to obtain high productivity.

Hartsells loam, 0 to 5 percent slopes (HaA).—The surface layer of this soil is 3 to 7 inches thicker than that of Hartsells loam, 5 to 12 percent slopes, moderately eroded. Also, the subsoil is finer textured, and the water-holding capacity is greater. In some places mottling occurs at a depth of 30 inches or more. Some small areas, near the upper parts of the slopes, are moderately eroded.

This soil is suited to general farm crops, especially potatoes. On sloping areas farm operations should be done on the contour to help hold water where it falls. If the fertility of the soil is built up and maintained, crops make good yields. Growing grass a large part of the time in the rotation and returning crop residues to the soil are necessary to maintain the content of organic matter in the surface layer. Lime and fertilizer ought to be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit I-1; woodland suitability group 1.)

Hartsells loam, 5 to 12 percent slopes (HaB).—The surface layer of this soil is 2 to 4 inches thicker than the one in the profile considered typical for the series. This soil is gently sloping and has had little or no erosion because most of it is still in trees. In some small areas fragments of sandstone, 2 to 4 inches in diameter, are on the surface and throughout the profile.

This soil is suited to general farm crops, especially potatoes. If it is cleared and used for farming, it needs to be protected by contour stripcropping and diversion terraces. Management that restores or maintains the content of organic matter in the surface layer should be used. Apply lime and fertilizer according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIe-1; woodland suitability group 2.)

Hartsells loam, 5 to 12 percent slopes, moderately eroded (HaB2).—The profile of this soil is considered typical for the series. Most areas are on rolling hilltops and on gently sloping hillsides. Some small areas contain many small fragments of sandstone.

This soil is well suited to alfalfa and potatoes. Most crops common to the county can be grown, however, if the fertility is maintained. Contour stripcropping and diversion terraces are needed to control erosion and to prevent the loss of water by runoff. The content of organic matter can be maintained if a crop rotation of medium intensity is used and if crop residues are returned to the soil. Lime and fertilizer ought to be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIe-1; woodland suitability group 2.)

Hartsells loam, 12 to 20 percent slopes, moderately eroded (HaC2).—This soil is somewhat shallower than Hartsells loam, 5 to 12 percent slopes, moderately eroded. Depth to the bottom of the subsoil ranges from 30 to 46 inches, but in most places it is about 40 inches. Most of this soil is on rolling hilltops and on strongly sloping hillsides.

Alfalfa and most of the other crops commonly grown in the county grow well on this soil. Conservation practices, such as contour stripcropping and diversion terraces, are needed to prevent excess runoff and to control erosion. Returning crop residues to the soil and growing grass a large part of the time in the cropping system are necessary to maintain the content of organic matter and to improve the structure of the soil. Applications of lime and fertilizer should be made according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIIe-1; woodland suitabiilty group 2.)

Holston Series

The Holston series consists of deep, well-drained soils on alluvial terraces above the present level of stream overflow. These soils range from nearly level to moderately steep, but in most places they are strongly sloping. In cultivated fields their surface layer is dark grayish-brown silt loam. The subsoil is dark yellowish-brown to yellowish-brown silty clay loam. These soils were formed in water-deposited material that was washed from soils underlain by acid sandstone and shale. The profile of Holston silt loam, 5 to 12 percent slopes, is considered typical for this series.

The Holston soils are on the high terraces of Red Bank and Mahoning Creeks and also along the Clarion River. These soils are near or adjacent to the moderately well drained Monongahela and the well drained Sequatchie soils. They lack the strong mottling and the fragipan in the lower part of the subsoil that is typical of the Monongahela soils. Their profile is lighter colored than that of the Sequatchie soils, and they are less susceptible to flooding.

The Holston soils are moderately permeable and have high water-holding capacity. They are slightly acid to very strongly acid and are low in natural plant nutrients.

Holston silt loam, 0 to 5 percent slopes (HoA).—The profile of this soil is 3 to 10 inches deeper than that of Holston silt loam, 5 to 12 percent slopes, and the surface layer is slightly thicker. In some small areas 25 to 75 percent of the surface layer has been lost through erosion and small gullies have formed. In other places faint mottling is present at a depth of 24 to 26 inches.

Alfalfa and the general farm crops commonly grown in the county grow well on this soil. Contour stripcropping and a proper rotation are needed to reduce the hazard of erosion. Organic matter can be incorporated in the surface layer by turning crop residues under as green manure. Lime and fertilizer ought to be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit I-1; woodland suitability group 1.)

Holston silt loam, 5 to 12 percent slopes (HoB).—The profile of this soil is considered typical for the series. In some places fragments of stone and gravel, 1 to 5 inches in diameter, are on the surface and in the profile. In some small areas more than 25 percent of the original surface layer has been lost through erosion.

Alfalfa and other deep-rooted legumes grow well on this soil. Contour stripcropping and diversion terraces are needed to control erosion. Small seep areas or springs can be eliminated by installing tile underdrains. Growing a cover crop and returning crop residues to the soil help to protect the soil and to maintain the content of organic matter in the surface layer. Lime and fertilizer ought to be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIe-1; woodland suitability group 2.)

Holston silt loam, 12 to 20 percent slopes, moderately eroded (HoC2).—The profile of this soil is similar to the one considered typical for the series, except that it is shallower and about 25 to 75 percent of the surface layer has been lost through erosion. In some small wooded areas, the surface layer is 3 to 5 inches thicker than the one in the profile considered typical. In other areas the slope is greater than 20 percent.

Holston silt loam, 12 to 20 percent slopes, moderately eroded, is well suited to alfalfa and other deep-rooted crops if it is heavily limed and fertilized. Contour stripcropping and diversion terraces are needed to protect it from runoff and to help control erosion. Growing a cover crop and returning crop residues to the soil help to build up and maintain the content of organic matter in the surface layer. Lime and fertilizer ought to be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIIe-1; woodland suitability group 2.)

Leetonia Series

Moderately deep or deep, gently sloping to very steep, well-drained, sandy soils of the uplands make up the Leetonia series. In undisturbed wooded areas a thin layer of black, partly decomposed organic matter covers the mineral soil. The upper layer of mineral soil is leached, gray and pinkish-gray sandy loam, and it is underlain by a thin band of dark reddish-brown sandy loam. The subsoil is dark yellowish-brown sandy loam. These soils were formed on coarse-grained sandstone and conglomerate. Leetonia very stony sandy loam, 0 to 12 percent slopes, has a profile considered typical for this series.

The most extensive areas of these soils are in the northern one-third of the county and at high elevations in the southern part. Near or adjacent to these soils are the well drained Dekalb and Hartsells soils and the moderately well drained Cookport soils. The Leetonia soils have a coarser textured subsoil than the Dekalb soils. They are shallower than the Hartsells soils and lack the clayey subsoil. The Leetonia soils do not have the pan layer, the clayey subsoil, or the mottling common to the Cookport soils. Undisturbed Leetonia soils can be distinguished by the dark reddish-brown band, 1 to 3 inches thick, immediately below the 4 to 8 inches of nearly white sandy loam in the upper part of the mineral soil.

The Leetonia soils are coarse textured and are rapidly permeable. They are droughty and low in natural fertility, and they are extremely acid to strongly acid. These soils are limited to use for woodland. Chestnut oak, hemlock, and white pine are the dominant kinds of trees.

Leetonia very stony sandy loam, 0 to 12 percent slopes (LeB).—The profile of this soil is considered typical for the series. The leached, white, sandy subsurface layer varies in thickness, and in places it tongues into the subsoil to a depth of 18 inches. The brown mineral band in the lower part of the surface layer ranges from ½ inch to 4 inches in thickness. Where this soil is on the brow of a mountain ridge, it is generally shallow. In such areas the trees are generally of low grade and have stunted growth. In some small areas the surface layer is free of stones, and in other areas this soil is subject to erosion.

All of this soil is wooded. The principal trees are chestnut oak, hickory, hemlock, and white pine. Rhododendron, laurel, huckleberry, and teaberry make up the understory. Because this soil is droughty, stony, and shallow, it should remain in trees. Under proper management, good yields of pulpwood and timber can be harvested. The woodland ought to be protected from fire and grazing. (Capability unit VIIs–2; woodland suitability group 5.)

Leetonia very stony sandy loam, 12 to 35 percent slopes (LeD).—The profile of this soil is shallower over bedrock than the one considered typical for the series, and the surface layer is 2 to 5 inches thinner. Permeability is rapid, and the water-holding capacity is low.

All of this very stony soil is in trees. The soil is fair for growing hemlock and white pine, but it is not fertile and is too droughty for producing more selective hardwoods. The woodland ought to be protected from fire and grazing. (Capability unit VIIs–2; woodland suitability group 5.)

Leetonia very stony sandy loam, 35 to 80 percent slopes (LeF).—The profile of this soil resembles the one considered typical for the series, except that it is shallower and has a thin, leached subsurface layer. In places the layer of dark reddish-brown sandy loam is only 2 to 5 inches below the surface. This soil is very droughty and is low in natural fertility.

This soil is in trees, and chestnut oak is the dominant species. Hemlock and white pine grow better than do the better quality hardwoods. The woodland ought to be protected from fire and grazing. (Capability unit VIIs–2; woodland suitability group 7.)

Made Land (Ma)

This miscellaneous land type consists of areas where the soil profile has been altered by earth-moving operations. Now, there is no recognizable profile. The land type includes areas of land fill used for housing developments and areas of sanitary land fill, railroad yards, and ball fields. There are also leveled, reclaimed areas that were formerly used for strip mining.

Because the soil material in this land type is so variable, the management also needs to be varied to meet the needs in a specific area. For this reason, Made land was not included in a capability unit. Where Made land has been used for housing developments, the soil material in the fill is generally of a good enough quality that lawn grasses, ornamental trees, shrubs, and gardens grow well if lime and fertilizer are applied properly.

Mine Dumps (Md)

This miscellaneous land type consists of large piles of soil and rock waste from deep mines. A mixture of coal, slate, sandstone, and shale makes up the refuse material, which is piled in steep-sided heaps at the openings of the mines. Much of the soil material is too acid to support plants. In old material, where the acids have leached out and the rocks have weathered and broken down, such volunteer plants as grape and berry-producing vines, grass, birch, and aspen establish cover and help to stabilize these mounds. (Capability unit VIIIs–1.)

Monongahela Series

The Monongahela series consists of deep, nearly level to gently sloping, moderately well drained soils on old alluvial terraces above the present level of stream overflow. In tilled fields the surface layer is very dark grayish-brown silt loam. The subsoil is yellowish-brown heavy silt loam that has mottles of olive brown and strong brown at a depth of 18 inches. A tight, dense, brittle layer, called fragipan, at a depth of 18 to 30 inches is typical of these soils. In places there are layers of fine to coarse sand and small pebbles in the subsoil. These soils were developed in alluvial sediment, which was washed from soil material underlain by acid sandstone and shale. They are slightly acid to strongly acid. Monongahela silt loam, 0 to 3 percent slopes, has a profile considered typical for the series.

The Monongahela soils are on terraces along Toby, Red Bank, Sandy Lick, Mahoning, and Little Sandy Creeks. They are near or adjacent to the well-drained Holston soils. The Monongahela soils have a less brownish subsoil and contain more gravel than the Holston soils.

Monongahela silt loam, 0 to 3 percent slopes (MoA).—The profile of this soil is considered typical for the series. Water moves through the surface layer at a moderate rate. It moves slowly through the subsoil, however, because of the nearly impervious fragipan. This soil has a high capacity for storing moisture that plants can use. Erosion is slight in most areas.

Near Brockway, a large area of this soil is underlain by stratified sand and gravel. A well-developed fragipan is at a depth of 18 to 30 inches in the gravel.

This soil is not well suited to winter grain or alfalfa; it is better suited to pasture, hay, spring grain, and corn. Tile drains are needed to eliminate seep spots. Where the soil is cultivated, graded field strips and diversion terraces should be used to control runoff and erosion. Growing grass a large part of the time in the cropping system and returning crop residues to the soil help to maintain the content of organic matter and to improve the workability of the surface layer. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIw–1; woodland suitability group 8.)

Monongahela silt loam, 3 to 8 percent slopes (MoB).—This soil has a profile similar to the one considered typical for the series, but it has stronger slopes and is therefore more susceptible to erosion. In most places the soil is only slightly eroded, but some small areas are moderately eroded. The fragipan is at a depth 2 to 5 inches greater than the one in the typical profile.

Included in the mapped areas of this soil is about 15 acres of Monongahela silt loam, 8 to 15 percent slopes, on an eroded edge of a stream terrace along Red Bank Creek.

Monongahela silt loam, 3 to 8 percent slopes, is suitable for general farm crops, hay, and pasture. Graded field strips and diversion terraces are used to remove runoff and to help control erosion. Lime and fertilizer are needed to grow most of the crops adapted to this soil. (Capability unit IIe–2; woodland suitability group 8.)

Montevallo Series

Shallow, well-drained soils of the uplands make up the Montevallo series. In tilled fields the surface layer is yellowish-brown shaly silt loam. The subsoil is light yellowish-brown shaly silty clay loam. These soils were formed on gray and yellow shale and on thin-bedded sandstone. A profile that is considered typical for the series is that of Montevallo shaly silt loam, 20 to 35 percent slopes, moderately eroded.

The Montevallo soils are mainly on ridgetops and on rolling hills that have steep sides. They range from nearly level to very steep, but most areas are strongly sloping. These soils are most common in the southern two-thirds of the county, but some small areas are in the northern part. Near or adjacent to the Montevallo soils are the well-drained Gilpin and Wellston soils and the somewhat poorly drained Cavode soils. The Montevallo soils are shallower over bedrock than the Gilpin and Wellston soils. They are also somewhat lighter colored and have a less developed subsoil. They are shallower and coarser textured than the Cavode soils, and their subsoil is less mottled and contains less clay.

The Montevallo soils are droughty, low in natural fertility and in water-holding capacity, and subject to severe erosion. They have moderately rapid permeability. The reaction ranges from medium acid to very strongly acid.

Montevallo shaly silt loam, 20 to 35 percent slopes, moderately eroded (MsD2).—The profile of this soil is considered typical for the series. This soil is moderately steep and is on hillsides. Erosion is moderate in nearly all of the cleared areas and moderate to slight in the wooded areas.

Because it is steep and shallow, this soil is not suited to general farm crops, and it is difficult to manage for hay or pasture. Under good management fair yields of pasture can be obtained, but the soil is better suited to trees. Care should be taken not to overgraze the pasture. Woodland production is moderate. (Capability unit VIIs–1; woodland suitability group 13.)

Montevallo-Gilpin shaly silt loams, 0 to 5 percent slopes (MvA).—This complex consists of Montevallo shaly silt loam and of Gilpin shaly silt loam. The two soils occur in such an intricate pattern that it is impractical to show them separately on a soil map like the one in the back of this report. The properties of the two soils are similar, but the Gilpin soil is somewhat deeper than the Montevallo. The soils are farmed as a unit because of their complex pattern and similar response to management. Their profiles are 4 to 10 inches deeper than the profile considered typical for the Montevallo series. Most of the acreage in this complex is on the extreme tops of hills and on small plateaus.

Included in the mapped areas of this complex are small areas of a severely eroded soil that has a large amount of coarse fragments throughout the subsoil.

The soils of this complex are suited to small grains and hay crops, but they are too droughty for good yields of corn. Growing grass a large part of the time in the cropping system and returning crop residues to the soils help to maintain the content of organic matter and to make these soils more productive. Contour stripcropping and diversion terraces reduce runoff and help to control erosion. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIIs–1; woodland suitability group 11.)

Montevallo-Gilpin shaly silt loams, 5 to 12 percent slopes, moderately eroded (MvB2).—The profiles of the soils in this complex are similar to the profile considered typical for the Montevallo series, but they are 3 to 6 inches deeper. Most of the acreage is on rounded ridgetops and on the upper parts of side slopes. A few small areas are severely eroded.

Because these soils are shallow and droughty, most farm crops grow poorly on them. Fair yields of birdsfoot trefoil can be expected. The content of organic matter can be maintained by growing crops in a crop rotation of low intensity and by returning crop residues to the soils. Contour stripcropping and diversion terraces are needed to reduce runoff and to help control erosion. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIIs–1; woodland suitability group 12.)

Montevallo-Gilpin shaly silt loams, 12 to 20 percent slopes, moderately eroded (MvC2).—The soils in this complex have profiles similar to the one considered typical for the Montevallo series, but they are 2 to 5 inches deeper. They are on rounded ridgetops and on side slopes in the uplands. Some areas are severely eroded.

These soils are low in natural fertility. They are too shallow and droughty for good yields of general farm crops. Fair yields of birdsfoot trefoil, however, can be obtained under proper management. The content of organic matter can be maintained only by keeping these soils under permanent cover, except when renewing the stand of grass or clover in a small grain. Contour stripcropping and diversion terraces are necessary to protect the soils from runoff and to help control erosion. Apply lime and fertilizer according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IVe–3; woodland suitability group 12.)

Nolo Series

The Nolo series is made up of deep, somewhat poorly drained or poorly drained soils of the uplands. In undisturbed wooded areas a thin layer of loose leaves, twigs, and moss covers a layer of numerous fibrous roots and partly decomposed leaves from hardwoods. The surface layer is dark-gray to gray silt loam and is underlain by fine sandy loam. The subsoil is strong-brown silty clay loam that has mottles of light brownish gray and gray beginning at a depth of 8 to 10 inches. The parent material is acid sandstone and shale. The profile of Nolo silt loam, 0 to 3 percent slopes, is considered typical for the series.

The Nolo soils are nearly level to gently sloping and are in concave areas on the tops of broad plateaus and ridges. Most of the acreage is in the northern one-third of the county, but some small areas are at high elevations in the southern part. These soils are commonly near or adjacent to the well drained Dekalb soils and the moderately well drained or somewhat poorly drained Cookport soils. The Nolo soils are deeper and more clayey than the Dekalb soils. The pan layer and mottling are nearer the surface than in the Cookport soils.

Because of their subsoil of tight silty clay loam and the pan layer, the Nolo soils are slowly permeable to water and air. The water table is high throughout most of the year. The water-holding capacity is moderate to high. These soils are strongly or very strongly acid. About 85 percent of the acreage is in trees, and the rest is in pasture or tilled crops, or is idle.

Nolo silt loam, 0 to 3 percent slopes (NoA).—The profile of this soil is considered typical for the series. This soil is on the tops of broad, nearly level plateaus, where surface drainage is poor and internal drainage is very slow. Fragments of sandstone 2 to 6 inches in diameter are generally on the surface and throughout the profile.

Included in the mapped areas of this soil are several areas of a moderately well drained, sandy soil. The included areas are too small to be mapped separately.

Nolo silt loam, 0 to 3 percent slopes, is not well suited to wheat or alfalfa, but it produces fair yields of shallow-rooted hay crops and pasture. Cattle should not be grazed early in spring until the soil has had a chance to dry. Forested areas should be protected from grazing because the roots of the trees are shallow and easily damaged. In areas used for hay and pasture, open drains and bedding improve the surface drainage and increase the yields of crops. Applications of lime and fertilizer are necessary to increase the fertility of this soil. (Capability unit IVw–1; woodland suitability group 10.)

Nolo silt loam, 3 to 8 percent slopes (NoB).—The surface layer of this soil is as much as 3 inches thinner than that in the profile considered typical for the series, and the pan layer is 4 to 8 inches deeper. The water table is also 3 to 10 inches lower than that in the soil for which a profile is described, and this allows the soil to dry out several days earlier in spring. Fragments of sandstone as large as 4 inches in diameter are common on the surface and throughout the profile.

Small areas of a better drained soil that has a sandy subsoil are included in the mapped areas of this soil. Also included are a few small areas of a soil that has slopes steeper than 8 percent. In those areas the wetness is a result of seeping ground water.

Nolo silt loam, 3 to 8 percent slopes, is suited to birdsfoot trefoil and other shallow-rooted hay crops. Small grains and alfalfa grow poorly and are subject to winterkill and to damage by frost action. Pastures are fair, but cattle should not be grazed in spring until the soil has had a chance to dry. The woodland should be protected from grazing because roots concentrate near the surface and are subject to damage by trampling. Where this soil is farmed, open ditches and bedding improve surface drainage. Applications of lime and fertilizer improve fertility and provide for higher yields. (Capability unit IVw–1; woodland suitability group 10.)

Nolo very stony silt loam, 0 to 8 percent slopes (NsB).—This soil has a profile similar to the one considered typical for the series. However, it has numerous sandstone boulders, ranging from less than 1 foot to more than 8 feet in diameter, on the surface and throughout the profile.

Nearly all of this soil is wooded, but a few small areas are in permanent pasture. The roots of trees grow near the surface because of poor internal drainage and poor aeration, and they are subject to damage by trampling. The woodland should be protected from fire and grazing. (Capability unit VIIs–3; woodland suitability group 10.)

Philo Series

The Philo series consists of deep, moderately well drained or somewhat poorly drained soils on flood plains. In wooded areas a loose layer of twigs and leaves covers the surface layer of dark grayish-brown silt loam. The subsoil is dark yellowish-brown and light brownish-gray heavy silt loam that has strong-brown and yellowish-red mottles below a depth of 24 inches. These soils were formed in recent alluvium. This material was washed from acid, upland soils of sandstone and shale origin.

The Philo soils are in all parts of the county. They are nearly level and are along most streams that are subject to flooding. Near or adjacent to these soils are the well-drained Pope and the poorly drained or somewhat poorly drained Atkins soils. The Philo soils are less dark colored and less strongly mottled near the surface than the Atkins soils. They have more mottles near the surface than the Pope soils.

The Philo soils are very strongly acid or strongly acid. They have high water-holding capacity and are moderately permeable to water and air.

Philo silt loam (Ph).—This is the only Philo soil mapped in the county. It has slopes of 0 to 5 percent, but in most areas the slopes are between 0 and 2 percent. Some small areas are concave and are poorly drained. During wet seasons or after heavy rains, these areas retain water for short periods.

Areas of this soil vary widely in frequency of flooding. On former high bottoms in the backwater area of the Mahoning Flood Control Reservoir, the areas are flooded more frequently than formerly and the floodwaters remain for a longer period of time. This area is south of Hamilton.

Philo silt loam is suited to small grains, corn, and grass. Birdsfoot trefoil and grasses that tolerate wetness grow and produce well. Alfalfa and winter grains are subject to winterkill because of periodic wetness. The natural waterways should be kept open, and the soil ought to be protected by a cover of plants during periods of flooding. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIw-2; woodland suitability group 8.)

Pope Series

In the Pope series are deep, well-drained soils of flood plains. The profile is weakly developed. Where these soils are cultivated, they have a surface layer of dark-brown silt loam. The subsoil is dark-brown and dark reddish-brown silt loam that has mottles of gray and yellowish red below a depth of 40 inches. The Pope soils were formed in recent alluvium washed from soils underlain by acid sandstone and shale. The profile of Pope silt loam is considered typical for the series.

These soils are nearly level and are in areas that border streams. They are subject to frequent flooding. The soils occur throughout the county, but they occupy only a small acreage. Near or adjacent to the Pope soils are the moderately well drained or somewhat poorly drained Philo and the poorly drained Atkins soils. The Pope soils are less mottled and have a browner subsoil than the Philo and Atkins soils.

The Pope soils have moderate to rapid permeability and high water-holding capacity. They are very strongly acid or strongly acid.

Pope fine sandy loam (Pp).—The profile of this soil is similar to that of Pope silt loam, except that the texture is more variable. In places the profile is sandy throughout. In general, the texture ranges from silt loam to fine sandy loam in the surface layer and from silt loam to sandy loam or sand in the subsoil. The slopes range from 0 to 5 percent, but in most places they are between 0 and 2 percent. In many places there are beds of gravel beneath the subsoil.

This soil is suited to most crops commonly grown in the county, including alfalfa and corn. Cover crops established in a row crop or after a row crop offer protection from scouring during periods of flooding, help to maintain the content of organic matter, and improve the structure of the soil. Applications of lime and fertilizer should be made according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit I-2; woodland suitability group 1.)

Pope silt loam (Ps).—The profile of this soil is considered typical for the series. Most of this soil is in bands parallel to streams that frequently overflow. This soil is not extensive, and it is usually farmed with other soils.

Alfalfa, corn, and other crops commonly grown in the county grow well on this soil. Cover crops established in a row crop or after a row crop help protect the soil from washing during periods of flooding. Growing cover crops and returning crop residues to the soil provide organic matter and increase yields. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown.

Mapped with this Pope soil are some soils that were formerly Sequatchie soils. These soils have been changed as the result of frequent flooding and deposition. They receive sediment that is deposited by the backwaters of the Mahoning Flood Control Reservoir. (Capability unit I-2; woodland suitability group 1.)

Purdy Series

The Purdy soils are deep and poorly drained. Where they have been cultivated, the surface layer is gray or dark grayish-brown silt loam. The subsoil is gray clay loam and has yellowish-red and reddish-brown mottles at a depth of 10 inches. These soils developed in old, stratified deposits of clay and silt on alluvial terraces along most of the larger streams in the county.

The Purdy soils are in nearly level or slightly concave areas. They adjoin soils formed in colluvium or in material weathered from bedrock. Near or adjacent to the Purdy soils are the well drained Sequatchie, the moderately well drained Monongahela, and the somewhat poorly drained Tyler soils. The Purdy soils are more clayey than the Sequatchie soils, and they have a less brownish subsoil. They lack the typical fragipan of the Monongahela soils, but they have a tighter subsoil. Mottling is nearer the surface than in the Tyler soils.

The Purdy soils are slightly acid near the surface and strongly acid deeper in the profile. Water moves through these soils slowly because of the tightness of the subsoil. These soils have a moderate capacity for storing water that plants can use.

Purdy silt loam (Pu).—This is the only Purdy soil mapped in the county. It is limited in use because the ground water level remains high most of the season. Most of this nearly level soil is in concave areas on old stream terraces. It receives much of the runoff from the soils above.

Included in the mapped areas of this soil are areas of a very poorly drained, clayey soil on stream terraces. These included areas are too small to be mapped separately.

On most areas of Purdy silt loam, there is a dense growth of willow, alder, and spirea that makes ideal cover for wildlife. This soil can be used for hay and pasture if it is cleared and drained. After it has been adequately drained, it is used occasionally to grow row crops and small grains.

Birdsfoot trefoil and grasses that tolerate wetness produce well on this soil. Open drains with bedding should be used to remove runoff, and random closed drains can be used to eliminate seep areas. Diversion terraces on soils that lie above this soil help to control runoff and to improve the workability of the soil. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IVw-2; woodland suitability group 10.)

Sequatchie Series

The Sequatchie series consists of deep, nearly level, well-drained soils on low terraces that are subject to occasional flooding. In cultivated fields the surface layer is dark yellowish-brown silt loam. The subsoil is yellowish-red and strong-brown silt loam.

These soils are mainly along the larger streams, such as Red Bank, Sandy Lick, Mahoning, Little Sandy, and Toby Creeks. Near or adjacent to them are the well-drained Pope and Holston soils. The Sequatchie soils have a more distinct B horizon than the Pope soils, and they are less frequently flooded. Their B horizon is less well developed than that of the Holston soils.

The Sequatchie soils are moderately permeable and have high water-holding capacity. They are moderate in natural fertility and are very strongly acid or strongly acid.

Sequatchie silt loam, 0 to 5 percent slopes (ScA).—This is the only Sequatchie soil mapped in the county. It is on low benches between the present flood plains and the high alluvial terraces. Flooding occurs on this soil no oftener than once in 20 to 50 years. The soil has a weakly developed profile, but a B horizon is apparent.

Alfalfa, small grains, and most crops commonly grown in the county grow well on this soil. There are no special hazards or problems that affect farming. A crop rotation of high intensity can be used. Crop residues need to be returned to the soil to improve the structure and to maintain the content of organic matter in the surface layer. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit I–1; woodland suitability group 1.)

Shelocta Series

The Shelocta soils are deep, well drained, and gently sloping. In cultivated fields their surface layer is very dark grayish-brown silt loam. The subsoil is dark yellowish-brown to yellowish-brown silty clay loam, and in places it has faint, gray mottles below a depth of 26 inches. These soils formed in colluvium below uplands that are underlain by sandstone and shale.

The Shelocta soils are on the lower parts of slopes and on benches in small, widely scattered areas throughout the county. Near or adjacent to them are the moderately well drained Ernest and the poorly drained Brinkerton soils. The Shelocta soils have a less brownish and more yellowish subsoil than the Ernest soils. Unlike the Ernest soils, which are mottled below a depth of 18 inches, they have little or no mottling. The Shelocta soils are less grayish than the Brinkerton soils, and they lack mottling throughout the subsoil.

The Shelocta soils have moderate permeability and moderate to high water-holding capacity. They are moderate in natural fertility and are very strongly acid or strongly acid.

Shelocta silt loam, 3 to 8 percent slopes, moderately eroded (ShB2).—This is the only Shelocta soil mapped in Jefferson County. It is on benches and colluvial slopes. Most of it is gently sloping, but a few small areas are nearly level. In some places the lower part of the subsoil is faintly mottled below a depth of 24 inches.

Included in the mapped areas of this soil are areas of a similar soil that has slopes of 8 to 15 percent.

Alfalfa, small grains, and most crops commonly grown in the county can be grown on Shelocta silt loam, 3 to 8 percent slopes, moderately eroded. This soil is usually farmed with adjacent soils that make up an operational unit. Because this soil occupies only small areas, conservation practices used on the associated Ernest soils apply to it. Applications of lime and fertilizer should be made according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIe–1; woodland suitability group 1.)

Strip Mines (Sm)

This miscellaneous land type consists of areas where the strip mining of coal took place. Surface strip mining began in this county in the early 1930's. Since then, it has been practiced extensively in all parts of the county. Most of the strip mining has taken place in areas of Gilpin, Montevallo, Cavode, and Wharton soils.

In strip mining operations the soil material and rock that cover the coalbeds are first moved to one side. During this process, the soil material, shale, sandstone, and carbonaceous shale are thoroughly mixed and are deposited on high mounds. If the relief is sloping, these mounds are continuous and follow the contour of the hill. A high wall remains on the upper part of the slope above the coal channel. The last cut, where the coal has been removed, remains as a channel through the coal until it is filled by slumping from the high wall or from the material of the last spoil bank.

In a few places where strip mining has taken place in farmland, the surface soil has been saved. Then, when stripping operations were completed, the area was leveled to its original contour and the surface soil was replaced. In a few other areas, the spoil piles were pushed into the channel and the topography was restored. This, however, left raw soil material, rock, and carbonaceous shale as a surface layer.

The exposed shale breaks down rapidly into fine shale chips. These chips, when mixed with silt and clay, produce a tight layer that resembles a pavement and is slowly permeable to water. Also, weathering of the carbonaceous shale produces extremely acid soil material. The bare shale and rock retain the heat of the sun, and a high surface temperature results. These factors are primary reasons for lack of natural revegetation on the spoil piles.

A few areas of Strip mines have been planted to grass for pasture. These plantings are successful only if the original surface soil is first replaced. Most areas are more suitable for revegetation with trees, shrubs, and vines than for revegetation with grass (fig. 9). (Capability unit VIIs–2; woodland suitability group 14.)

Figure 9.—Strip mine spoil that has been planted to Scotch pine. Volunteer aspen is also becoming established.

Tyler Series

In the Tyler series are deep, somewhat poorly drained, nearly level soils. The surface layer is dark-gray and yellowish-brown silt loam. The subsoil is gray and pale-brown silty clay loam that has mottles of yellow, reddish yellow, yellowish red, yellowish brown, and brown at a depth of 12 inches and below. These soils were developed in stratified deposits of clay and silt. They are on old alluvial terraces along most of the large streams in the county.

The Tyler soils are in areas where soils of the alluvial terraces adjoin soils formed in colluvium or in material weathered from bedrock. They are high enough above the present flood plain that they are not subject to frequent flooding. The most extensive areas are along Little Sandy Creek near Coolspring, along Sandy Lick Creek at Reynoldsville, and along Mahoning and Stump Creeks.

Near or adjacent to the Tyler soils are the moderately well-drained Zoar soils and the poorly drained Purdy soils. The Tyler soils are less brownish near the surface and in the subsoil than the Zoar soils. They have more yellowish and brownish colors in the upper part of the profile than the Purdy soils, which are poorly aerated.

The Tyler soils have a slowly permeable subsoil and high water-holding capacity. They are very strongly acid or strongly acid.

Tyler silt loam (Ty).—This is the only Tyler soil mapped in the county. It is on old alluvial stream terraces where soil particles were deposited by slowly moving or impounded water. The profile contains only a few stones or pebbles because the coarse fragments were dropped before the water deposited the finer material in which this soil was formed. Most of the areas are nearly level, but in some places the slope is as steep as 7 percent. In some small areas where this soil has been farmed, it has been moderately eroded.

This soil is moderately well suited to shallow-rooted crops that tolerate wetness. In cultivated areas or in pastures, open drains and bedding improve the surface drainage. Good surface drainage is difficult to obtain because of the nearly level relief and very slow internal drainage. Lime and fertilizer improve the fertility and increase yields. (Capability unit IIIw–1; woodland suitability group 8.)

Upshur Series

In this county the Upshur soils occur in small areas and are not used or managed separately. Therefore, they have not been mapped separately. They occur as small spots and streaks mingled with the Gilpin soils in a complex pattern, which has been mapped as Gilpin-Upshur silty clay loams. Typically the Upshur soil in this complex is a moderately deep, well-drained, slowly permeable silty clay loam that has a subsoil of silty clay or clay. It developed on red and bluish-gray, neutral or slightly calcareous shale. In some places limestone is associated with this shale to some extent.

Wellston Series

The Wellston series consists of deep, nearly level to moderately steep, well-drained, acid soils of the uplands. In tilled fields the surface layer is dark grayish-brown silt loam. The upper part of the subsoil is dark-brown silt loam, but below a depth of 28 inches, the subsoil is yellowish-brown silty clay loam. These soils were formed in material weathered from gray and yellow sandstone and shale. The profile of Wellston silt loam, 12 to 20 percent slopes, moderately eroded, is considered typical for the series.

The Wellston soils are mainly in the southern two-thirds of the county and in small areas in the northern part. Soils that commonly occur near or adjacent to them are the well-drained Gilpin and Montevallo and the somewhat poorly drained Cavode soils. The Wellston soils have a thicker and finer textured subsoil than the Gilpin and Montevallo soils. They have a less clayey and less tight subsoil than the Cavode soils.

The Wellston soils are moderate in permeability. Their capacity for storing water that plants can use is high. These soils are medium acid or strongly acid.

Wellston silt loam, 0 to 5 percent slopes (WnA).—The profile of this soil is 2 to 4 inches deeper than the profile considered typical for the Wellston series.

Included in the mapped areas of this soil are a few small areas of a soil that has poor surface drainage and a mottled subsoil.

Nearly all of Wellston silt loam, 0 to 5 percent slopes, has been cleared and is used for cultivated crops and pasture. Most field crops, pasture plants, and trees commonly grown in the county can be grown on this soil. If it is properly fertilized, this soil is especially well suited to potatoes and alfalfa. Where the soil is cultivated, it will benefit from contour stripcropping and the return of crop residues. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit I–1; woodland suitability group 1.)

Wellston silt loam, 5 to 12 percent slopes, moderately eroded (WnB2).—About 10 percent of the surface of this soil is covered with fragments of sandstone and shale. Erosion is generally moderate in all areas except those that are wooded. In the more sloping areas, the upper layers are thin and some material from the subsoil has been mixed into the plow layer.

This soil is suited to alfalfa, row crops, bluegrass grown for pasture, and other crops commonly grown in the county. Contour stripcropping and diversion terraces are used to control runoff and erosion in cultivated areas. Growing grass and legumes a large part of the time in the cropping system helps to maintain the content of organic matter and to improve tilth. Lime and fertilizer are needed to grow most of the crops suited to this soil. They should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIe–1; woodland suitability group 2.)

Wellston silt loam, 12 to 20 percent slopes, moderately eroded (WnC2).—This soil has a profile like the one considered typical for the series. Where the soil has been cleared and cultivated, from 25 to 75 percent of the surface layer has been lost through erosion. In wooded areas erosion is slight.

Most crops common to the county can be grown on this soil. Because of the serious hazard of further erosion, this soil needs the protection of contour stripcropping, diversion terraces, and a rotation in which a sod crop is grown at least half the time. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIIe–1; woodland suitability group 2.)

Westmoreland Series

The Westmoreland series is made up of moderately deep or deep, sloping to steep, well-drained soils of the uplands. These soils are in bands on hillsides, on the tops of hills, and on long slopes. The surface layer in tilled fields is dark-brown silt loam, and the subsoil is dark yellowish-brown and yellowish-brown silty clay loam. These soils were formed in mixed material weathered from sandstone, limestone, and calcareous shale. Westmoreland silt loam, 12 to 20 percent slopes, moderately eroded, has a profile that is considered typical for the series.

Most areas of Westmoreland soils are in the southern two-thirds of the county; the largest areas are around Worthville and south to Indiana County. Near these soils are the well drained Gilpin, the somewhat poorly drained Cavode, and the moderately well drained Guernsey soils. The Westmoreland soils have a subsoil that is darker brown than that of the Gilpin soils, and they are more clayey than those soils. They are also less acid and are generally deeper. They have less mottling near the surface and contain less clay in the subsoil than the Cavode and the Guernsey soils.

The Westmoreland soils are moderately acid except where free lime occurs in the subsoil. These soils are high in natural fertility. They produce excellent bluegrass pasture and above-average yields of grass-legume hay and row crops. Most crops commonly grown in the county can be grown on these soils. In areas where free lime has strongly influenced the reaction, potatoes are susceptible to scab. Trees grow well on these soils.

Westmoreland silt loam, 5 to 12 percent slopes, moderately eroded (WsB2).—Nearly all of this soil has been cleared for crops. As a result, 25 to 75 percent of the surface layer has been lost through erosion. This soil has moderate permeability and moderate capacity for storing moisture that plants can use. Some small areas are nearly level, and a few areas are severely eroded. In some small areas in depressions, faint mottling occurs in the lower part of the subsoil.

This soil is suited to alfalfa, corn, small grains, hay, and pasture. Where the soil is cultivated, contour stripcropping and diversion terraces are needed to control erosion. Growing grass a large part of the time in the cropping system and returning crop residues to the soil help to maintain the content of organic matter. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIe–1; woodland suitability group 2.)

Westmoreland silt loam, 12 to 20 percent slopes, moderately eroded (WsC2).—The profile of this soil is considered typical for the series. The soil has a moderate capacity for storing moisture that plants can use. Water moves through it at a moderate rate. A few small areas are severely eroded and contain gullies.

This soil is suited to alfalfa and most general farm crops. Because of the high risk of erosion, conservation practices should include contour stripcropping, diversion terraces, and a crop rotation in which hay crops are grown at least 2 years out of 4. Lime and fertilizer should be added according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIIe-1; woodland suitability group 2.)

Westmoreland silt loam, 20 to 35 percent slopes, moderately eroded (WsD2).—This soil has a profile similar to the one considered typical for the series, but it has a thinner subsoil. In most cleared areas some material that was formerly in the subsoil has been mixed with that in the surface layer. From 25 to 75 percent of the surface layer has been lost through erosion. Some small areas in woodland are less eroded than the rest of the acreage, and some small areas are severely eroded.

Because of the serious hazard of further erosion, this soil needs the protection of a good sod and should be plowed only for reseeding. It makes good pasture. The pastures should be limed and fertilized according to the needs indicated by soil tests. (Capability unit VIe–1; woodland suitability group 2.)

Wharton Series

In the Wharton series are moderately well drained, moderately deep soils on clay shale of the uplands. The surface layer is very dark brown silt loam. The subsoil is yellowish-brown silty clay loam that has faint mottles of brown and grayish brown at a depth of about 20 inches. These soils were formed on heavy carbonaceous shale that is interbedded with sandstone. The profile of Wharton silt loam, 3 to 8 percent slopes, moderately eroded, is considered typical for the series.

These soils are along benches, on flats, and on gentle slopes near ridgetops. Most of the acreage is in the southern two-thirds of the county, but some is in the northern part. Near or adjacent to these soils are the somewhat poorly drained Cavode and the well-drained Gilpin soils. The subsoil of the Wharton soils is browner and less mottled than that of the Cavode. The Wharton soils are deeper and more clayey than the Gilpin.

Permeability is moderate in the surface layer and slow in the subsoil, which causes the Wharton soils to be highly erodible. These soils have high water-holding capacity. They are very strongly acid or strongly acid unless recent liming has influenced the reaction in the surface layer.

Wharton silt loam, 0 to 3 percent slopes (WtA).—This nearly level soil has a surface layer 2 to 4 inches thicker than the one in the profile considered typical for the series. The claypan is 1 to 3 inches nearer the surface. Some small areas, especially those in depressions, are faintly mottled at a depth of only 15 inches.

This soil is suited to small grains, hay, and pasture. Because of the slowly permeable subsoil, alfalfa is often damaged when the soil becomes waterlogged. In cultivated areas graded field strips and terraces are needed to remove runoff. Tile drains are necessary to eliminate seep spots. Growing grass a large part of the time in the cropping system and returning crop residues to the soil help to maintain the content of organic matter and make the soil easier to work. Lime and fertilizer ought to be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIw–1; woodland suitability group 8.)

Wharton silt loam, 3 to 8 percent slopes (WtB).—The profile of this soil is similar to the one considered typical for the series, except that the surface layer is 2 to 6 inches thicker. If this soil is cultivated, it is quickly eroded. In some small areas, especially near seep spots and springs, drainage is particularly slow and mottling occurs at a depth of about 14 inches.

This soil is mainly in trees. It is moderately well suited to such crops as corn and alfalfa. Alfalfa and winter grains are sometimes damaged if the soils become temporarily waterlogged. Seep spots can be eliminated by the use of tile underdrains. Graded field strips and terraces are used to remove runoff and to help prevent erosion. Growing grass a large part of the time in the cropping system and growing a cover crop help to control erosion. Organic matter can be maintained by returning crop residues to the soil. Applications of lime and fertilizer should be made according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIe-2; woodland suitability group 8.)

Wharton silt loam, 3 to 8 percent slopes, moderately eroded (WtB2).—The profile of this soil is considered typical for the series. The soil is on rolling hilltops and on benches. Seep spots are common. In some places below the seeps and springs, the soil is mottled near the surface.

Alfalfa and other farm crops grow moderately well on this soil. Occasionally, alfalfa and small grains are damaged by winterkill when the soil becomes water-logged. However, crop yields are good in most years. Diversion terraces and graded field strips are used to control runoff and erosion. Growing grass a large part of the time in the cropping system and returning crop residues to the soil help to maintain the content of organic matter and improve the workability of the surface layer. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIe-2; woodland suitability group 8.)

Wharton silt loam, 8 to 15 percent slopes, moderately eroded (WtC2).—This soil is a little shallower and is less uniform in depth than Wharton silt loam, 3 to 8 percent slopes, moderately eroded. A few fragments of sandstone or shale are on the surface. Some wooded areas are slightly eroded, and a few areas are severely eroded and contain small gullies.

General farm crops can be grown on this soil, but because of its slope and its susceptibility to erosion, more attention needs to be paid to erosion control. Diversion terraces and graded field strips are needed to remove runoff and to help prevent erosion. A long rotation in which row crops are planted no more than 1 year in 4 should be used. Growing cover crops and returning crop residues to the soil will help protect exposed areas and will return organic matter to the surface layer. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIIe-2; woodland suitability group 9.)

Zoar Series

In the Zoar series are deep, moderately well drained soils on alluvial terraces. The surface layer in cultivated fields is very dark grayish-brown silt loam. The subsoil is yellowish-brown silty clay loam that has mottles of light brownish gray and strong brown below a depth of 24 inches. These soils developed in stratified deposits of clay and silt on old stream terraces.

The Zoar soils occur along the larger streams, but they are mainly along Mahoning and Little Sandy Creeks. They are nearly level or are in slight depressions. They are in depressions particularly where the alluvial terraces adjoin areas of soils formed in colluvium or in material weathered from bedrock. Near or adjacent to these soils are the poorly drained Purdy and the somewhat poorly drained Tyler soils. The Zoar soils have a more yellowish subsoil and are less strongly mottled in the upper part of the subsoil than the Tyler and Purdy soils.

The Zoar soils have moderate water-holding capacity. Permeability in the subsoil is slow. These soils are low in natural fertility and are very strongly acid to medium acid.

Zoar silt loam, 0 to 3 percent slopes (ZoA).—This is the only soil of the Zoar series mapped in the county. It was formed in fine-textured sediment where floodwaters have ponded. There are some small areas that have a somewhat poorly drained subsoil.

This soil is suited to row crops, alfalfa, and most crops commonly grown in the county. In wet years some crops may be damaged by frost, and yields may be reduced. Seep spots can be eliminated by installing tile drains. Growing grass a large part of the time in the cropping system and returning crop residues to the soil maintain the content of organic matter and improve the workability of the surface layer. Lime and fertilizer should be applied according to the needs indicated by soil tests and the requirements of the crop to be grown. (Capability unit IIw-1; woodland suitability group 8.)

Formation, Morphology, and Classification of Soils

This section deals with the origin and development of the soils of Jefferson County. First, the factors of soil formation are described. Then, the relationship of the parent material and drainage to the soils in the county is discussed. After that, the soils are classified into great soil groups, and these groups are explained. Finally, each soil series is discussed, and a technical description of a typical profile is given for each series.

Factors of Soil Formation

Soils are formed as a result of the interaction of five principal factors—climate, parent material, relief, plant and animal life, and time (*15*). The characteristics of any particular soil are determined by the active influence of each of these factors and by variations in the combinations of the factors. The importance of each factor varies from place to place. Although they are important in a broad sense, climate, plant and animal life, and time have had little effect in producing local differences among the soils in the county. Parent material and relief, however, have had strong influence in creating local differences.

Climate—Climate influences the formation of soils through the moisture and energy it transmits. It has a direct influence on the weathering of rocks and on the decomposition of minerals and organic matter. Favorable conditions of moisture and heat speed the processes of soil development.

Parent material—The characteristics of the parent material strongly influence the kind of changes that take place and the time involved in the formation of a soil. In this county only sedimentary rocks are exposed. Most of the geological formations contain soft shale, coarse-grained sandstone, and limestone of the Pennsylvanian system. These rocks are subject to destruction when other soil-forming factors are in correct proportion. The Pocono sandstone of the Mississippian system is exposed to only a limited extent in this county; it is harder and is more resistant to weathering than the other rocks.

Parent material also has a direct relationship to the type of soil produced and to its potential use and value (*17*). Shale and clay shale dominate the areas at low elevations in the southern two-thirds of the county. The northern one-third of the county and the higher areas in the south are underlain mainly by sandstone bedrock.

Relief—Differences in relief have a strong influence on the kind of soil that can develop from a given parent material. Where the relief is fairly smooth, but not level enough to keep water standing, deep, well-drained soils, such as those of the Holston or Wellston series, are likely to form.

If the slope is steep enough, the soil material is removed by natural causes almost as rapidly as it forms. Soils in steep areas are likely to remain shallow over bedrock. The Dekalb, Gilpin, and Leetonia soils are examples of such soils.

If the relief is nearly level and little water runs off, a large part of the precipitation will percolate downward through the soil. Much of the clay from the surface layer is carried downward in the percolating water to the subsoil. Eventually the clay fills the spaces between other soil granules in the subsoil, and a claypan develops. Examples of this effect can be seen in the Brinkerton and Cavode soils.

Plant and animal life—Plants and animals affect soils in several ways. They add organic matter to the surface layer. Plant roots absorb minerals and also return minerals to the soil. The material in the surface layer is often mixed with that in the subsoil through the uprooting of trees and, to some extent, by the activity of burrowing animals and insects. However, it seems unlikely that differences in the plants and animals in the county have been significant enough to explain any of the major differences among the soils.

Time—The weathering of rocks and the development of soils proceed at a slow pace. In this county deep, medium-textured soils that have a clayey subsoil indicate that the soil material has been in the same place for thousands of years. The clayey subsoil has formed as the result of clay particles moving out of the surface layer into the subsoil by the leaching action of water over a long period of time, from the clay shale weathering and the clay remaining in place, or from a combination of both. Soils on flood plains do not have such a characteristic (clayey subsoil), because they are constantly being altered by deposition of fresh sediment. Such soils are considered very young.

Soil Series in Relation to Parent Material and Drainage

Table 8 shows the relationship of the parent material and drainage to the soils in the county. The kinds of parent material are named in the table, and the drainage class is shown for the soils formed in each kind of parent material.

In well-drained soils water is removed from the soil readily but not rapidly. Well-drained soils are generally medium textured, although soils of other textural classes may also be well drained. As a rule, they are free of mottling, but they may be mottled deep in the C horizon or at a depth of several feet.

In moderately well drained soils, water is removed from the soil somewhat slowly so that the profile is wet for a small, but significant, part of the time. Moderately well drained soils commonly have a slowly permeable layer within or immediately beneath the solum, a relatively high water table, additions of water through seepage, or a combination of these.

In somewhat poorly drained soils, water is removed from the soil slowly enough so that the soil is wet for significant periods but not all of the time. Somewhat poorly drained soils commonly have a slowly permeable layer within the profile, a high water table, additions of water through seepage, or a combination of these.

Water is removed so slowly in a poorly drained soil that the soil remains wet for a large part of the time. The water table is commonly at or near the surface during a considerable part of the year. Poor drainage is caused by a high water table, by a slowly permeable layer within the profile, by seepage, or by a combination of these factors.

Water is removed so slowly from a very poorly drained soil that the water table remains at or on the surface the greater part of the time. Soils of this drainage class are in nearly level areas or depressions and are frequently ponded. Very poorly drained soils in the podzolic soil regions commonly have a dark-gray or black surface layer, and they are light gray below. In some places they have mottling deep in the profile, but in other places the mottling is absent.

Classification of the Soils

The soil series of Jefferson County have been classified into great soil groups (*12*). Soils of six great soil groups and of six intergrades are present in the county. The soils of an intergrade have some characteristics of each of two or more great soil groups. A description of one or two representative profiles for each soil series in the county is given in the section "Detailed Descriptions of Soil Profiles."

Gray-Brown Podzolic soils

Gray-Brown Podzolic soils in this county are those of the Guernsey and Upshur series. In undisturbed wooded areas these soils have a thin layer of humus over a dark-colored surface layer. The lower part of the surface layer is leached and grayish brown. Beneath this, the subsoil is brown or yellowish brown, contains an accumulation of clay, and has blocky or subangular blocky structure.

Soils of the Sequatchie series are classified as intergrades between Gray-Brown Podzolic soils and Alluvial soils.

TABLE 8.—*Soil series in relation to parent material and drainage*

Topographic position and parent material	Well drained	Moderately well drained	Somewhat poorly drained	Poorly drained	Very poorly drained
Uplands:					
Weathered, acid, gray and brown sandstone with some shale.	Dekalb	Cookport [1]		Nolo [2]	Brinkerton, very wet.
	Hartsells	Cookport [1]		Nolo [2]	Brinkerton, very wet.
Weathered, coarse, clean sandstone and conglomerate.	Leetonia				
Weathered, acid, gray and brown shale, siltstone, and sandstone.	Montevallo				
	Gilpin				
	Wellston				
Weathered, acid, gray clay shale		Wharton	Cavode	Armagh	Brinkerton, very wet.
Mixed, weathered, gray shale and calcareous red shale.	Gilpin-Upshur				
Mixed, weathered shale, sandstone, and limestone.	Westmoreland	Guernsey [1]			
Colluvial-alluvial lower slopes:					
Acid, gray and brown, mixed silty and sandy material.	Shelocta	Ernest [1]		Brinkerton [2]	Brinkerton, very wet.
Old alluvial terraces above flood plains:					
Silt, clay, and fine sand	Holston	Monongahela			
Clay deposited in still water		Zoar	Tyler	Purdy	
Alluvial terraces, or high first bottoms, that are seldom flooded:					
Silt, clay, and fine sand	Sequatchie				
Flood plains:					
Alluvial material from uplands underlain by acid sandstone and shale.	Pope	Philo [1]		Atkins [2]	Atkins.

[1] Includes the better drained part of the somewhat poorly drained class.

[2] Includes the poorer drained part of the somewhat poorly drained class.

These soils do not have weak enough horizonation to qualify as Alluvial soils, and they receive enough deposition as a result of infrequent flooding that they do not show enough characteristics of age to be called Gray-Brown Podzolic soils.

Soils of the Ernest, Gilpin, Shelocta, Westmoreland, and Wellston series are classified as intergrades between Gray-Brown Podzolic soils and Red-Yellow Podzolic soils. They have some characteristics of each of the two great groups but are mainly like Gray-Brown Podzolic soils. These soils resemble the Gray-Brown Podzolic soils in depth of the solum, sequence of horizons, color, texture, and structure. They have a low degree of base saturation, however, like soils of the Red-Yellow Podzolic great soil group.

Lithosols

Lithosols are thin, slightly developed soils on rock. The normal sequence of horizons is an A horizon over the parent horizon of broken bedrock. There are no true Lithosols in this county.

Because they have some expression of a B horizon, even though it is weak, the Montevallo soils are classified as Lithosols intergrading toward Sols Bruns Acides. The Montevallo soils are shallow and developed on beds of shale and sandstone. They have no clearly expressed soil morphology. Parent material and relief have a strong influence on them. Most of these soils are on strongly sloping hillsides and ridgetops.

In many places accumulations of clay are present in the subsoil, and in some places there is enough clay to make the texture silty clay loam. The structure of these soils is weakly developed. Loose fragments of shale and small fragments of sandstone are common in the plow layer, and coarser fragments of stone are in the subsoil. The Montevallo soils are shallower on the steeper slopes.

Red-Yellow Podzolic soils

Soils of the Hartsells series are in this great soil group. These soils are strongly leached, naturally acid, and low in natural plant nutrients.

In undisturbed wooded areas there is a thin mat of partly decayed leaf litter. Below this is a thin, gray or dark-gray A1 horizon of mixed organic matter and mineral matter. A thin, gray A2 horizon lies beneath the A1 horizon. Where the soils are cultivated, the A1 and A2 horizons are mixed and form a dark grayish-brown, medium-textured plow layer.

The B horizon is generally thick and is yellowish brown or reddish yellow. It is much finer textured than the surface layer. Generally, the base saturation decreases with increasing depth. Mottling in the lower part of the B horizon is common.

Soils of the Cavode, Cookport, Holston, Monongahela, Wharton, and Zoar series are classified as Red-Yellow Podzolic soils that are intergrading toward Gray-Brown Podzolic soils. They have a reddish hue, high chroma, generally heavy texture, and low base saturation, all of which are characteristic of Red-Yellow Podzolic soils. Their depth of solum, structure, and sequence of horizons are like those of Gray-Brown Podzolic soils.

The Tyler soils are classified as intergrades between Red-Yellow Podzolic soils and Planosols. These soils are somewhat poorly drained or poorly drained, and they have a well-defined, clayey subsoil that resembles the claypan that is characteristic of Planosols. The upper part of the profile is like that of the Red-Yellow Podzolic soils. It is strongly leached, acid, low in plant nutrients, and low in content of organic matter. The subsoil contains distinct, red or yellowish mottles.

Podzols

The Leetonia soils are the only Podzols in this county. These strongly acid soils were developed on coarse sandstone, and they are generally shallow over bedrock.

They have a thin, black A1 horizon, covered with a few inches of leaf mat and acid humus. The A2 horizon is pinkish gray and is underlain by a dark reddish-brown Bir horizon that overlies a dark yellowish-brown B2 horizon.

Sols Bruns Acides

Soils of the Dekalb series belong to the Sols Bruns Acides great soil group. They are strongly leached, acid soils that have a weak, thin A1 horizon. They do not show a distinct increase in clay in the B horizon. The B horizon is distinguished from the A horizon almost entirely on the basis of differences in color.

The boundary between the A and B horizons is not abrupt. There is little change in color throughout the B horizon. These soils have a low degree of base saturation.

Low-Humic Gley soils

In the Low-Humic Gley great soil group are the Armagh, Atkins, Brinkerton, and Nolo soils. These soils are somewhat poorly drained or poorly drained, and they have poor surface drainage or a high water table. The surface layer is thin, dark gray, and moderately high in content of organic matter. In many places fine material has washed in from higher areas and has accumulated on the surface. Prominent mottling begins within a few inches of the surface. The B horizon is generally fine textured and plastic when it is wet. These soils are medium acid or strongly acid.

The Purdy soils are Low-Humic Gley soils that are intergrading toward Planosols. Their B horizon contains more clay than the B horizon of a true Low-Humic Gley soil.

Alluvial soils

Alluvial soils form in material that has been deposited recently by stream overflow. In this great soil group are the Philo and Pope soils. These soils are young and have weak horizonation. Their morphology is determined primarily by the order in which the materials were deposited.

These soils are constantly forming on the flooded banks of streams. As a rule, they are in narrow bands on the flooded sides of streams.

Detailed Descriptions of Soil Profiles

This section briefly discusses the soil series and gives a detailed description of a profile that is typical for each series. The great soil group is also mentioned for each series, some facts are given about the parent material, and the associated soils are named.

Armagh series.—In this series are acid, moderately deep or deep, poorly drained Low-Humic Gley soils of the uplands. The soils developed from weathered clay shale, with some mixture of silty material, and they are underlain by stratified clay shale, siltstone, and thin beds of sandstone. The Armagh soils are associated with the somewhat poorly drained Cavode soils and the moderately well drained Wharton soils.

Typical profile of Armagh silt loam, 0 to 3 percent slopes, in an idle field that was previously farmed, 2 miles south of Brookville along Port Barnett–Knox Dale Road. Sampled for characterization (profile S 58–Pa–33–12–(1–7)). Modal Armagh silt loam.

Ap—0 to 6 inches, dark grayish-brown (2.5Y 4/2) silt loam; fine to medium, granular structure; friable when moist; very strongly acid; abrupt, smooth boundary; 5 to 6 inches thick.

B1g—6 to 11 inches, brown (10YR 5/3) silty clay loam with many, fine, prominent mottles of strong brown (7.5YR 5/8) and light brownish gray (10YR 6/2); moderate, medium, subangular blocky structure; friable to firm when moist, plastic when wet; thin, partial clay coatings of pale brown (10YR 6/3); very strongly acid; clear, wavy boundary; 3 to 6 inches thick.

B21g—11 to 15 inches, brown (10YR 5/3) silty clay loam with many, fine, prominent mottles of strong brown (7.5YR 5/8) and light brownish gray (10YR 6/2); weak, medium, prismatic structure breaking to moderate, medium, blocky structure; firm when moist, plastic when wet; distinct clay coatings of pale brown (10YR 6/3); very strongly acid; clear, wavy boundary; 3 to 5 inches thick.

B22g—15 to 23 inches, dark-brown (10YR 4/3) silty clay loam with common, fine, prominent mottles of gray (10YR 5/1), light gray (10YR 6/1), and yellowish red (5YR 5/8); polygons break to weak, fine and medium blocks; very firm in place when moist; many black coatings and small concretions; very strongly acid; clear, irregular boundary; 5 to 11 inches thick.

B31g—23 to 30 inches, dark-brown (10YR 4/3) silty clay loam with common, coarse, prominent mottles of gray (10YR 6/1) and reddish brown (5YR 4/3); polygons break to moderate, medium blocks; firm when moist, slightly plastic when wet; clay coatings 2 millimeters thick on the faces of the polygons; some black coatings that decrease in number with increasing depth; very strongly acid; clear, wavy boundary; 5 to 10 inches thick.

B32g—30 to 38 inches, brown (7.5YR 5/2) silty clay loam with common, medium, prominent mottles of gray (N 5/0, 10YR 6/1) and reddish brown (5YR 4/4); polygons break to moderate, medium, plates; firm when moist, slightly plastic when wet; clay coatings on polygons 2 millimeters thick; some black coatings on plates; very strongly acid; clear, wavy boundary; 6 to 10 inches thick.

Cg—38 to 48 inches, brown (7.5YR 5/4) silty clay loam with many, coarse, prominent mottles of gray (N 6/0) and reddish brown (2.5YR 4/4); weak, thick, platy structure; very firm when moist, slightly plastic when wet; partial clay coatings; some black coatings on plates.

These soils range from 30 to 60 inches in depth over bedrock. The sequence of horizons is not consistent; an A2g or C2g horizon is present in some places but absent in others. In tilled areas the surface layer is dark grayish brown to reddish brown. The color of the subsoil ranges from brown to gray in most places. The dominant texture in the subsoil is silty clay loam, but it ranges to silty clay that, in places, contains numerous fragments of shale.

Profile of Armagh silt loam, 0 to 3 percent slopes, in an idle field 3 miles south of Reynoldsville and 2 miles west of Sykesville along a blacktop road in Winslow Township. Sampled for characterization (profile S 58–Pa–33–16–(1–7)). Modal Armagh silt loam.

Ap—0 to 8 inches, dark-gray (10YR 4/1) silt loam; weak, fine, granular structure; friable when moist; very strongly acid; clear, wavy boundary; 7 to 9 inches thick.

A2g—8 to 10 inches, gray (10YR 6/1) heavy silt loam with many, fine, distinct mottles of yellowish brown (10YR 5/8) and very dark brown (10YR 2/2); weak to moderate, fine, granular structure that has some platiness; friable to firm when moist; contains some brown and black concretions; strongly acid; clear, wavy boundary; 1 to 3 inches thick.

B1g—10 to 15 inches, light brownish-gray (10YR 6/2) silty clay loam with many, medium, prominent mottles of gray (10YR 6/1) and strong brown (7.5YR 5/8); moderate, medium, subangular blocky structure; friable to firm when moist, slightly plastic when wet; a few clay films and a few black concretions; strongly acid; gradual, wavy boundary; 4 to 7 inches thick.

B21g—15 to 24 inches, light-gray (N 6/0) silty clay with many, medium, prominent mottles of gray (10YR 6/1) and strong brown (7.5YR 5/8); mixed, weak, fine, blocky and moderate, medium, subangular blocky structure; firm when moist, plastic when wet; partial prominent clay films on the peds; a few black concretions; strongly acid; gradual, wavy boundary; 7 to 11 inches thick.

B22g—24 to 29 inches, silty clay with many, coarse, prominent mottles of light gray (N 6/0) and strong brown (7.5YR 5/8); light-gray (N 6/0) coatings on peds; weak polygons break to moderate, medium, blocks; firm when moist, plastic when wet; prominent clay films on peds; some black concretions; strongly acid; abrupt, irregular boundary; 4 to 7 inches thick.

B3g—29 to 41 inches, light-gray (N 6/0) shaly silty clay loam with many, coarse, prominent mottles of strong brown (7.5YR 5/8), brown (10YR 5/3), and black (10YR 2/1); polygons break to moderate, medium blocks; firm when moist, plastic when wet; many black concretions; clay films on polygons; some bedded shale; strongly acid; abrupt, irregular boundary; 9 to 15 inches thick.

D1—41 to 46 inches, strong-brown (7.5YR 5/8) and dark-brown (7.5YR 3/2) silty clay loam with gray (10YR 6/1) coatings on the faces of the polygons; horizontally bedded shale with polygons extending into this horizon; very firm when moist; coatings slightly sticky and plastic; strongly acid.

Atkins series.—In this series are acid, deep, very poorly drained to somewhat poorly drained soils on flood plains that are subject to frequent overflow. The soils are in the Low-Humic Gley great soil group. They developed in alluvial material that is closely related to the mixed sandstone, siltstone, and shale of the uplands in the county. The Atkins soils are associated with the moderately well drained Philo and the well drained Pope soils.

Typical profile of Atkins silt loam along Fivemile Run, 1 mile south of Brookville at Norman:

A00—2 inches to 0, loose leaves and twigs from hemlock, white pine, and birch.

A1—0 to 5 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; very friable when moist, nonplastic when wet; very strongly acid; gradual, wavy boundary; 4 to 7 inches thick.

AC—5 to 15 inches, gray (10YR 5/1) silt loam with common, medium, distinct mottles of yellowish red (5YR 4/8) and strong brown (7.5YR 5/8); very weak, fine to medium, subangular blocky structure; very friable when moist, nonplastic when wet; strongly acid; clear, wavy boundary; 9 to 11 inches thick.

C—15 to 37 inches, light yellowish-brown (10YR 6/4) loamy fine sand with common, medium, distinct mottles of yellowish red (5YR 4/8) and strong brown (7.5YR 5/8); no apparent structure; loose when moist; strongly acid; clear, wavy boundary; 21 to 23 inches thick.

D—wet gravel beds and loose sand.

The profile is weakly developed and extends to a depth of 36 to 52 inches. The surface layer is white to dark gray. In most places its texture is silt loam, but in some small areas it is fine sandy loam. The color of the subsoil is light gray to pale brown, and its texture is silt loam to silty clay loam or silty clay. There are pockets of fine sand in a few places between the finer textured layers.

Brinkerton series.—The Brinkerton soils are deep, medium textured, and medium or strongly acid. They are somewhat poorly drained or poorly drained Low-Humic Gley soils that have a fragipan. The soils were developed in deep colluvial material or in old, deep alluvial material that was weathered from acid, gray shale and sandstone of the uplands. They are associated with the moderately well drained or somewhat poorly drained Ernest soils and the well drained Shelocta soils. The Brinkerton soils are mainly on concave slopes adjacent to the Gilpin, Dekalb, Montevallo, Wharton, and Cavode soils.

Typical profile of Brinkerton silt loam, very wet, 0 to 3 percent slopes, in a pasture that was formerly cultivated, about one-half mile west of Sugar Hill. Sampled for characterization (profile S 58–Pa–33–8–(1–6)); the C horizon, however, was not sampled. Modal Brinkerton silt loam.

AP—0 to 6 inches, dark grayish-brown (2.5Y 4/2) silty clay loam; weak, fine, granular structure; friable when moist; moderately acid; abrupt, wavy boundary; 5 to 7 inches thick.

B1g—6 to 11 inches, greenish-gray (5BG 6/1) heavy silty clay loam with common, medium, prominent mottles of yellowish red (5YR 5/8) and reddish brown (5YR 5/4); weak, medium, platy structure to weak, fine, subangular blocky; friable when moist, sticky when wet; thin, discontinuous clay coatings; moderately acid; clear, irregular boundary; 4 to 12 inches thick.

B21g—11 to 16 inches, greenish-gray (5BG 6/1) light clay with few, medium, prominent mottles of strong brown (7.5YR 5/8 to 6/8) and yellowish red (5YR 5/8); weak, medium, blocky structure; firm when moist, sticky when wet; thick, discontinuous clay coatings; moderately acid; abrupt, very irregular boundary; 3 to 10 inches thick.

B22g—16 to 26 inches, strong-brown (7.5YR 5/8) and reddish-yellow (7.5YR 6/8) heavy silty clay loam with many, fine, prominent mottles of greenish gray (5BG 6/1); weak, fine, blocky structure with a tendency to platiness; friable to firm when moist, sticky when wet; thick, discontinuous clay coatings; polygons 4 to 5 inches in diameter; moderately acid; abrupt, irregular boundary; 8 to 12 inches thick.

B3g—26 to 33 inches, strong-brown (7.5YR 5/8) and reddish-yellow (7.5YR 6/8) clay with many, medium, prominent mottles of greenish gray (5BG 6/1); weak, medium, blocky structure; firm when moist, sticky when wet; moderately acid; polygons; thin, discontinuous clay coatings; abrupt, wavy boundary; 5 to 9 inches thick.

Bm—33 to 51 inches, dark yellowish-brown (10YR 4/4) heavy silty clay loam with many, coarse, prominent mottles of strong brown (7.5YR 5/8); massive polygonal structure; firm when moist, sticky when wet; moderately acid.

C—51 inches +, dark yellowish-brown silty clay loam; massive.

Depth of bedrock ranges from 3 to 20 feet. The texture of the subsoil is silty clay loam in most places, but it is clay in others. The reaction in the subsoil is medium acid or strongly acid.

Profile of Brinkerton silt loam, very wet, 0 to 3 percent slopes, in a pasture 0.6 mile west of Knox Dale and 0.7 mile north on a dirt road in Knox Township. Sampled for characterization (profile S 58–Pa–33–7–(1–6)). Modal Brinkerton silt loam.

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silty clay loam; weak, fine, granular structure; friable when moist; some material from the B1g horizon mixed with that in the AP; strongly acid; abrupt, irregular boundary; 6 to 8 inches thick.

B1g—7 to 11 inches, greenish-gray (5GY 6/1) silty clay loam with many, medium, prominent mottles of light olive brown (2.5Y 5/4) and strong brown (7.5YR 5/8); weak, fine, blocky structure; friable to firm when moist, sticky when wet; thin, discontinuous clay films; strongly acid; gradual, wavy boundary; 3 to 6 inches thick.

B21g—11 to 19 inches, greenish-gray (5GY 6/1) heavy silty clay loam with many, coarse, prominent mottles of strong brown (7.5YR 5/8) and splotches of black and dark brown; weak, medium, blocky structure that breaks to weak, fine, subangular blocky; friable to firm when moist, sticky when wet; thin, discontinuous clay films; strongly acid; abrupt, wavy boundary; 6 to 10 inches thick.

B22m—19 to 24 inches, gray (10YR 6/1) heavy silty clay loam with many, coarse, prominent mottles of strong brown (7.5YR 5/8); weak, medium, blocky structure; firm when moist, sticky when wet; thick, discontinuous clay films; medium acid; abrupt, wavy boundary; 3 to 7 inches thick.

B3—24 to 34 inches, greenish-gray (5GY 6/1) heavy silty clay loam with many, coarse, prominent mottles of strong brown (7.5YR 5/8); moderate, coarse, prismatic structure; firm when moist, sticky when wet; some scattered black coatings on the faces of peds; very thick, discontinuous clay films; medium acid; gradual, wavy boundary; 8 to 12 inches thick.

C1—34 to 48 inches, greenish-gray (5G 6/1) heavy silty clay loam with many, medium, prominent mottles of dark yellowish brown (10YR 4/4); black concretions; massive with some tendency toward polygonal structure; very firm when moist, sticky when wet; very thick lenses of clay; neutral.

Cavode series.—The Cavode soils are acid, moderately deep or deep, somewhat poorly drained Red-Yellow Podzolic soils of the uplands, but they are intergrading toward Gray-Brown Podzolic soils. They developed mainly on weathered, acid clay shale, but in a few places, on weathered clay shale that contains some lime. They are associated with the moderately well drained Wharton and the poorly drained Armagh soils. The Cavode soils are widely distributed throughout the county and are on benches, smooth ridgetops, and the lower parts of slopes.

Typical profile of Cavode silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated field 1½ miles northwest of Brookville. Sampled for characterization (profile S 58–Pa–33–10–(1–7)). Modal Cavode silt loam.

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) heavy silt loam; moderate, coarse, granular structure; friable when moist; a few stones; neutral reaction (limed); abrupt, wavy boundary; 6 to 10 inches thick.

B1—8 to 14 inches, yellowish-brown (10YR 5/6 to 5/8) silty clay loam; weak, fine, subangular blocky structure; friable when moist; 5 percent stone fragments; numerous roots; moderately thick, continuous clay coatings; numerous wormholes coated with material from Ap horizon extend into next horizon; neutral reaction (limed); clear, wavy boundary; 4 to 7 inches thick.

B21—14 to 17 inches, yellowish-brown (10YR 5/6 to 5/8) silty clay loam with few, fine, distinct mottles of light brownish gray (2.5Y 6/2) and strong brown (7.5YR 5/6); weak, fine, blocky structure with very thin plates; friable when moist; thick, continuous clay coatings; 5 percent stone fragments; slightly acid; clear, wavy boundary; 2 to 4 inches thick.

B22g—17 to 25 inches, yellowish-brown (10YR 5/6) light silty clay with many, medium, distinct mottles of light gray (N 7/0); pale-brown (10YR 6/3) clay coatings on the peds, and the interior of the peds is strong brown (7.5YR 5/6); weak, thin, platy structure breaking to weak, fine, blocky; friable when moist, sticky when wet; thick, continuous clay coatings; 5 percent stone fragments; strongly acid; clear, wavy boundary; 6 to 10 inches thick.

B23g—25 to 33 inches, dark yellowish-brown (10YR 4/4) light silty clay with many, medium, distinct mottles of light brownish gray (2.5Y 6/2), strong brown (7.5YR 5/6), brown (10YR 5/3), and yellowish brown (10YR 5/4); moderate to strong polygons of weak, medium, prismatic structure breaking to weak, medium, blocky; friable to firm when moist; thick, continuous clay coatings; roots follow polygon faces; 20 percent stone fragments; very strongly acid; clear, wavy boundary; 6 to 10 inches thick.

B24g—33 to 37 inches, strong-brown (7.5YR 5/6) silty clay loam with many, coarse, distinct mottles of light brownish gray (10YR 6/2) and light gray (2.5Y 7/2); moderate to strong, coarse, prismatic structure; firm when moist; very thick, continuous clay coatings; very strongly acid; clear, wavy boundary; 6 to 10 inches thick.

B3—37 to 45 inches, dark-brown (10YR 4/3) and dark yellowish-brown (10YR 4/4) silt loam with common, fine, prominent, black (N 1/0) mottles and a few, strong-brown (7.5YR 5/6) mottles; moderate to strong, very coarse polygonal structure with a tendency toward weak, thick, platy structure; very firm when moist; a few thin, clay coatings in pores and cracks; strongly acid.

C—45 inches+, stratified clay shale, strongly acid. (Not sampled.)

Depth to clay shale ranges from 34 to 60 inches. A few small fragments of sandstone and shale are on the surface and throughout the profile. The texture of the C horizon ranges from fine sandy loam to silty clay loam.

Profile of Cavode silt loam, 8 to 15 percent slopes, moderately eroded, in a hayfield one-half mile southwest of Brookville, along Route 28 in Rose Township. Also sampled for characterization (profile S 58–Pa–33–9–(1–8)). Modal Cavode silt loam.

Ap—0 to 9 inches, very dark grayish-brown (10YR 3/2) heavy silt loam; weak, fine to medium, granular structure; friable when moist; neutral (limed); abrupt, smooth boundary; 8 to 10 inches thick.

B1—9 to 12 inches, brownish-yellow (10YR 6/6) and strong-brown (7.5YR 5/8) silty clay loam; moderate, fine and medium, subangular blocky structure; friable to firm when moist; medium acid; clear, wavy boundary; 1 to 5 inches thick.

B21g—12 to 15 inches, strong-brown (7.5YR 5/6) silty clay loam with common, fine, distinct mottles of light brownish gray (10YR 6/2) and strong brown (7.5YR 5/8); moderate, medium, subangular blocky and blocky structure; friable when moist; strongly acid; clear, wavy boundary; 2 to 4 inches thick.

B22g—15 to 21 inches, yellowish-brown (10YR 5/4) silty clay loam with abundant, medium, prominent mottles of gray (10YR 6/1) and yellowish red (5YR 5/6); moderate, medium, prismatic to blocky structure; firm when moist, slightly plastic when wet; thick, continuous clay films; strongly acid; clear, wavy boundary; 5 to 7 inches thick.

B23g—21 to 31 inches, yellowish-brown (10YR 5/4) silty clay loam with abundant, medium, prominent mottles of gray (10YR 6/1), yellowish red (5YR 5/8), and reddish brown (2.5YR 5/4); polygons break to moderate, medium prisms; firm when moist; coatings 2 to 3 millimeters thick on the faces of the polygons; very strongly acid; gradual, wavy boundary; 8 to 12 inches thick.

B31g—31 to 39 inches, dark-brown (10YR 4/3) silty clay loam with many, medium, distinct, mottles of gray (10YR 6/1) and strong brown (7.5YR 5/6); polygons break to moderate, medium blocks; firm when moist; clay films 3 to 4 millimeters thick; strongly acid; clear, wavy boundary; 7 to 9 inches thick.

B32—39 to 42 inches, brown and dark-brown (10YR 4/3 to 5/3) silty clay loam with coatings of light gray (10YR 7/1) and streaks of strong brown (7.5YR 5/6) on the peds; polygons break to weak, thin and medium plates; firm when moist; strongly acid; clear, wavy boundary; 2 to 5 inches thick.

C—42 to 54 inches, brown and dark-brown (10YR 4/3 to 5/3) silty clay loam with coatings of light gray (10YR 7/1) and streaks of strong brown (7.4YR 5/6) on the peds, as in the B32 horizon; coarse polygons break to weak, thin plates; firm, but less firm than the B32 horizon; strongly acid.

Cookport series.—In this series are strongly acid, moderately deep or deep, moderately well drained soils that have a fragipan. The soils are in the Red-Yellow Podzolic great soil group but are intergrading toward Gray-Brown Podozlic soils. These soils are in the uplands where material from yellow and gray sandstone is prevalent. They are associated with the moderately deep to shallow Dekalb, the deep, well-drained Hartsells, and the poorly drained or somewhat poorly drained Nolo soils. The Cookport soils are on broad flats and on gently sloping ridges.

Typical profile of Cookport very stony loam, 0 to 8 percent slopes, in forest, 0.9 mile west of Ross Leffler School of Conservation. Sampled for characterization (profile S 58-Pa-33-1-(1-9)). Modal Cookport very stony loam.

A00—2½ inches to 1 inch, undecomposed leaf litter of maple, cherry, birch, beech, and poplar.

A0—1 inch to 0, black (3/0 to 2/0) loamy organic material; weak, fine, granular structure; friable when moist; micropodzol occurs irregularly; very strongly acid; abrupt, irregular boundary; ½ inch to 3 inches thick.

A21—0 to 4 inches, yellowish-brown (10YR 5/6) loam with a few, fine, faint mottles of very dark gray (10YR 3/1) and dark brown (10YR 3/3) silt loam; weak, fine, granular structure with some slight platiness; friable when moist; very strongly acid; clear, irregular boundary; 3 to 5 inches thick.

A22—4 to 11 inches, dark yellowish-brown (10YR 4/4) loam with a few, fine, faint mottles of yellowish brown (10YR 5/6); very weak, fine, granular structure with some slight platiness; friable when moist; strongly acid; clear, wavy boundary; 6 to 8 inches thick.

B1—11 to 16 inches, yellowish-brown (10YR 5/6) silty clay loam; weak, medium, blocky structure; friable to firm when moist; thin, discontinuous clay coatings; strongly acid; clear, wavy boundary; 4 to 6 inches thick.

B21—16 to 22 inches, yellowish-brown (10YR 5/8) heavy silty clay loam with common, fine, faint mottles of brownish yellow (10YR 6/6); moderate, medium, blocky structure; friable to firm when moist; thick, discontinuous clay coatings; strongly acid; clear, wavy boundary; 5 to 7 inches thick.

B22—22 to 27 inches, yellowish-brown (10YR 5/8) silty clay loam with few, fine, faint mottles of brownish yellow (10YR 6/6); weak to moderate, medium, blocky structure; friable to firm when moist; thin, continuous clay coatings; strongly acid; clear, wavy boundary; 4 to 6 inches thick.

B23—27 to 34 inches, yellowish-brown (10YR 5/8) clay loam with common, medium, faint mottles of yellow (10YR 7/6); weak, coarse, blocky structure with a tendency toward prismatic and polygonal structure; friable to slightly firm when moist; moderate, thick, continuous clay coatings; strongly acid; clear, wavy boundary; 6 to 9 inches thick.

B24m—34 to 41 inches, strong-brown (7.5YR 5/8) and reddish-yellow (7.5YR 6/8) heavy clay loam with many, medium, distinct mottles of yellow (10YR 7/6) and yellowish red (5YR 5/8); weak, coarse, prismatic structure breaking to weak, fine, blocky structure; firm to friable when moist; polygons 4 inches in diameter; clay coatings on the faces of polygons; strongly acid; clear, wavy boundary; 6 to 9 inches thick.

C1—41 to 47 inches, strong-brown (7.5YR 5/8) silty clay loam and very coarse sand with many, medium, distinct mottles of yellow (10YR 7/6); massive with some platiness; firm when moist, sticky when wet; numerous black coatings and accumulations; strongly acid.

The Cookport soils range from 30 to 60 inches in depth over bedrock. The texture of their subsoil is clay loam in most places but it ranges to heavy clay loam and sandy loam. A fragipan layer in the subsoil slows permeability, and the soil stays wet and cold until late in spring. The depth to this fragipan ranges from 14 to 32 inches. The fragipan is more noticeable during dry periods than in wet.

Profile of Cookport very stony loam, 0 to 8 percent slopes, 0.3 mile west of the Hays Lot Fire Tower, opposite the lane to the tarpaper-covered hunting camp in Heath Township. Sampled for characterization (profile S 58-Pa-33-3-(1-9)). Modal Cookport very stony loam.

A00—3 to 2 inches, undecomposed hardwood leaf litter.

AO—2 inches to 0, black (10YR 2/1) organic matter; very weak, fine, granular structure; friable when moist; very strongly acid; abrupt, wavy boundary; 1 to 3½ inches thick.

A2—0 to 5 inches, yellowish-brown (10YR 5/4) silt loam; weak, fine, granular structure; friable when moist; strongly acid; abrupt, irregular boundary; 3 to 7 inches thick.

B1—5 to 11 inches, yellowish-brown (10YR 5/6) light clay loam; weak, fine, subangular blocky structure; friable when moist; strongly acid; clear, wavy boundary; 4 to 7 inches thick.

B21—11 to 16 inches, brownish-yellow (10YR 6/6) light clay loam; weak, fine to medium, blocky structure; friable when moist; strongly acid; clear, wavy boundary; 4 to 6 inches thick.

B22—16 to 21 inches, brownish-yellow (10YR 6/6) silty clay loam; weak, fine to medium, blocky structure; friable when moist; strongly acid; abrupt, wavy boundary; 4 to 7 inches thick.

B23m—21 to 25 inches, brownish-yellow (10YR 6/8) heavy silty clay loam with many, medium, distinct mottles of yellowish red (5YR 5/6), yellow (10YR 7/6), and light gray (10YR 7/2); moderate, medium, blocky structure; firm when moist; strongly acid; gradual, wavy boundary; 1 to 5 inches thick.

B24m—25 to 34 inches, yellowish-red (5YR 5/6) silty clay loam with common, fine, distinct mottles of gray (5YR 6/1) and reddish yellow (7.5YR 6/6); moderate, medium, blocky structure; firm when moist; strongly acid; gradual, wavy boundary; 6 to 11 inches thick.

B25m—34 to 41 inches, reddish-yellow (7.5YR 6/8) silty clay loam with many, coarse, prominent mottles of yellowish red (5YR 5/6), light gray (5YR 7/1), and strong brown (7.5YR 5/8); moderate to strong, coarse, prismatic structure; firm when moist, sticky when wet; strongly acid; abrupt, irregular boundary; 5 to 10 inches thick.

C1—41 to 46 inches, yellowish-red (5YR 5/6) heavy silty clay loam with common, fine, distinct mottles of reddish yellow (7.5YR 6/6) and light gray (2.5Y 7/1); moderate to strong, prismatic structure that breaks to fine, blocky structure; friable to firm when moist; strongly acid.

Dekalb series.—The Dekalb soils are strongly acid, moderately deep to shallow, well-drained, loamy or sandy Sols Bruns Acides of the uplands. They are underlain by weathered, yellow and gray sandstone. These soils are associated with the deep, well drained Hartsells, the moderately well drained or somewhat poorly drained Cookport, and the poorly or somewhat poorly drained Nolo soils.

Typical profile of Dekalb very stony loam, 12 to 35 percent slopes, in a wooded area about 2.5 miles west of Green Briar in Heath Township. Sampled for characterization (profile S 58–Pa–33–2–(1–7)). Modal Dekalb very stony loam.

A00—1½ inches to 1 inch, undecomposed hardwood leaf litter.
A0—1 inch to 0, black (N 2/0) organic matter and decomposed leaf litter; very strongly acid; abrupt, irregular boundary; ½ inch to 1½ inches thick.
A1—0 to 6 inches, dark yellowish-brown (10YR 4/4 loam; very weak, fine, granular structure; friable when moist; very strongly acid; clear, irregular boundary; 5 to 8 inches thick.
A3—6 to 9 inches, yellowish-brown (10YR 5/4) loam; weak, fine to medium, subangular blocky structure; friable when moist; very strongly acid; clear, irregular boundary; 2 to 4 inches thick.
B21—9 to 18 inches, yellowish-brown (10YR 5/4) loam; weak, fine to medium, subangular blocky structure; friable when moist; thin, discontinuous clay coatings in most pores; very strongly acid; clear, irregular boundary; 8 to 12 inches thick.
B22—18 to 24 inches, yellowish-brown (10YR 5/4) loam; weak, moderate, subangular blocky structure, friable when moist, slightly sticky when wet; thin, discontinuous clay coatings on peds and in pores; very strongly acid; clear, wavy boundary; 4 to 9 inches thick.
B3—24 to 31 inches, yellowish-brown (10YR 5/4 to 5/6) loam; weak, medium, subangular blocky structure; friable when moist, slightly sticky when wet; thin, discontinuous clay coatings; strongly acid; clear, wavy boundary; 5 to 11 inches thick.
C1–31 to 34 inches, light yellowish-brown (10YR 6/4) fine sandy loam; massive; friable when moist; thin, discontinuous clay coatings on peds and in pores; 90 percent stone fragments; strongly acid.

Depth to bedrock in the Dekalb soils ranges from 24 to 60 inches. In some places a light-colored subsurface layer, ranging from ½ inch to 3 inches in thickness, lies just beneath the organic layer. Locally, there are spots where a thin Podzol A2 horizon has developed in the surface 1 or 2 inches of mineral soil.

Ernest series.—Acid, deep, moderately well drained or somewhat poorly drained, moderately sloping soils that have a fragipan make up the Ernest series. The soils are in the Gray-Brown Podzolic great soil group but are intergrading toward Red-Yellow Podzolic soils. They developed in deep, colluvial or alluvial material. The Ernest soils are associated with the well-drained Shelocta and the poorly drained or somewhat poorly drained Brinkerton soils.

Typical profile of Ernest silt loam, 0 to 3 percent slopes, in a pasture 5 miles south of Brookville, along Pennsylvania Route 36 in Rose Township. Sampled for characterization (profile S 58–Pa–33–15–(1–9)). Modal Ernest silt loam.

Ap1—0 to 5 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure, slightly platy; friable when moist; slightly acid; abrupt, smooth boundary; 4 to 6 inches thick.
Ap2—5 to 11 inches, yellowish-brown (10YR 5/4) and dark yellowish-brown (10YR 4/4) silt loam; weak, medium to thick, platy structure breaking to weak, medium, subangular blocky; friable to firm when moist; moderately acid; clear, wavy boundary; 5 to 8 inches thick.
B1—11 to 17 inches, dark-brown (10YR 4/3) and strong-brown (7.5YR 5/6 to 5/8) silty clay loam; moderate, fine, subangular blocky structure; friable to firm when moist; moderately acid; clear, wavy boundary; 5 to 9 inches thick.
B21—17 to 24 inches, strong-brown (7.5YR 5/8) silty clay loam with common, medium, distinct mottles of reddish yellow (7.5YR 7/8) and yellowish brown (10YR 5/4); moderate, fine and medium, subangular blocky structure; friable when moist, slightly sticky and plastic when wet; moderately acid; clear, wavy boundary; 6 to 9 inches thick.
B22g—24 to 28 inches, light yellowish-brown (2.5Y 6/4) silty clay loam with many, medium, distinct mottles of yellowish red (5YR 5/6) and dark brown (7.5YR 4/4); weak, medium, prismatic structure; friable when moist, slightly sticky and plastic when wet; strongly acid; clear, irregular lower boundary; 2 to 7 inches thick.
B23g—28 to 37 inches, yellowish-brown (10YR 5/4) silty clay loam with many, coarse, prominent mottles of light-gray (N 7/0) and yellowish-red clay (5YR 5/8); moderate, coarse, prismatic structure breaking to thick and very thick platy; firm in place when moist, sticky and plastic when wet; black coatings on peds; strongly acid; abrupt, wavy lower boundary; 6 to 11 inches thick.
B24m—37 to 40 inches, strong-brown (7.5YR 5/6) light silty clay loam with common, medium, distinct mottles of light gray (2.5Y 7/0) and yellowish brown (10YR 5/6); weak, coarse prisms with weak, thin plates; very firm in place when moist, sticky and plastic when wet; strongly acid; abrupt, wavy boundary; 3 to 5 inches thick.
B3g—40 to 48 inches, yellowish-red (5YR 5/8) silty clay loam with common, medium, distinct mottles of light gray (N 7/0) and yellowish brown (10YR 5/6); coarse, prismatic structure breaking to weak, thick platy; firm to very firm when moist, slightly sticky and plastic when wet; strongly acid; clear, wavy boundary; 8 to 10 inches thick.
C1—48 to 56 inches +, strong-brown (7.5YR 5/6) silty clay with common, medium, distinct mottles of light gray (N 7/0) and yellowish brown (10YR 5/6); weak, coarse, prismatic structure with some platiness; nearly massive; very firm when moist; very strongly acid.

Depth to bedrock ranges from 3 to 20 feet. The A horizon ranges from 6 to 14 inches in thickness, and it is normally yellowish brown in the lower part. Depth to mottling ranges from 15 to 30 inches, but in most places it is 20 inches. The texture of the surface layer is silt loam, but the texture of the subsoil ranges from silty clay loam to silty clay.

Profile of Ernest silt loam, 3 to 8 percent slopes, moderately eroded, in a pasture 4 miles south of Brookville on Hunters Chapel Road in Knox Township. Sampled for characterization (profile S 58–Pa–33–13–(1–7)). Modal Ernest silt loam.

Ap—0 to 8 inches, very dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable when moist; strongly acid; clear, wavy boundary; 7 to 9 inches thick.
A2—8 to 11 inches, yellowish-brown (10YR 5/4) silt loam; weak, thin, platy structure that breaks to weak, fine, subangular blocky structure; friable when moist; strongly acid; clear, wavy boundary; 1 to 4 inches thick.
B1—11 to 15 inches, yellowish-brown (10YR 5/6) light silty clay loam; fine and medium, subangular blocky struc-

ture; friable when moist, moderately plastic when wet; considerable staining from organic matter in root channels and wormholes; thin, partial clay films; strongly acid; clear, irregular boundary; 3 to 6 inches thick.

B21—15 to 20 inches, yellowish-brown (10YR 5/4) silty clay loam with a few, medium, faint mottles of yellowish brown (10YR 5/6) and pale brown (10YR 6/3); moderate, fine and medium, subangular blocky structure; friable when moist, plastic when wet; many grass roots; prominent clay films; strongly acid; clear, wavy boundary; 4 to 6 inches thick.

B22g—20 to 31 inches, grayish-brown (2.5Y 5/2) silty clay with many, medium, distinct mottles of yellowish brown (10YR 5/4), yellowish red (5YR 4/8), and light brownish gray (10YR 6/2); moderate, medium, blocky structure; firm when moist; prominent clay films; strongly acid; gradual, wavy boundary; 10 to 14 inches thick.

B23g—31 to 42 inches, brown (10YR 5/3) silty clay loam with common, medium, prominent mottles of gray (N 6/0) and yellowish red (5YR 5/8); weak, medium polygons that break to moderate, medium blocks; firm to very firm in place when moist; partial grayish-brown (10 YR 5/2) clay films; strongly acid; abrupt, wavy boundary; 9 to 12 inches thick.

C1—42 to 50 inches, dark-brown (10YR 4/3) silty clay loam with a few black coatings; faces of polygons gray (N 6/0); few coarse polygons; firm when moist; strongly acid.

Gilpin series.—In this series are acid, moderately deep to shallow, well-drained soils of the uplands. The soils are in the Gray-Brown Podzolic great soil group but are intergrading toward Red-Yellow Podzolic soils. These soils are underlain by stratified siltstone, sandstone, and shale. They are associated with the shallow or very shallow Montevallo and the deep, well-drained Wellston soils. The Gilpin soils are on ridges and gentle to steep, convex slopes.

Typical profile of Gilpin silt loam, 12 to 20 percent slopes, moderately eroded, in a cultivated field 1 mile west of Anita in McCalmont Township.

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable when moist; 5 percent stone fragments; moderately acid, abrupt, wavy boundary; 6 to 9 inches thick.

B21—8 to 14 inches, yellowish-brown (10YR 5/6) silty clay loam; weak, fine to medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; 5 percent stone fragments; strongly acid; clear, wavy boundary; 5 to 7 inches thick.

B22—14 to 18 inches, yellowish-brown (10YR 5/6) silty clay loam; moderate, medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; 5 percent stone fragments; strongly acid; clear, wavy boundary; 3 to 5 inches thick.

B3—18 to 25 inches, yellowish-brown (10YR 5/6) silty clay loam; weak, medium, subangular blocky structure with some platiness; friable when moist, slightly sticky and slightly plastic when wet; 5 to 10 percent stone fragments; very strongly acid; abrupt, wavy boundary; 6 to 8 inches thick.

C—25 to 34 inches +, dark grayish-brown (10YR 4/2) silty clay loam; moderate, medium, platy structure and massive; firm when moist; 5 to 15 percent stone fragments; very strongly acid.

The soils of the Gilpin series range from 18 to 36 inches in depth over bedrock. The thickness and sequence of the horizons vary. In a few places an A3 or B1 horizon is present. In some places faint mottling is immediately above the bedded shale. The texture of the subsoil ranges from silty clay loam to silt loam or loam. Where many weathered fragments of sandstone occur, the subsoil is gritty.

Profile of Gilpin channery silt loam, 20 to 35 percent slopes, moderately eroded, in a field 1.6 miles south of Ohl in Beaver Township. Sampled for characterization (profile S 58–Pa–33–5–(1–4)). This profile is not modal for the Gilpin series in this area; it is shallower to bedrock and has weaker structural development than modal Gilpin channery silt loam.

Ap—0 to 8 inches, dark-brown (10YR 4/3) channery silt loam; weak, fine, granular structure; friable when moist; medium acid; abrupt, wavy boundary; 6 to 9 inches thick.

B2—8 to 14 inches, yellowish-brown (10YR 5/6) channery heavy silt loam; weak, fine to medium, subangular blocky structure; friable when moist; strongly acid; clear, wavy boundary; 5 to 8 inches thick.

B3—14 to 18 inches, yellowish-brown (10YR 5/6) channery silty clay loam; weak, medium, subangular blocky structure; friable when moist; thick, continuous clay films on shale fragments; strongly acid; abrupt, irregular boundary; 3 to 5 inches thick.

C1—18 to 22 inches, yellowish-brown (10YR 5/6) lenses of silty clay loam between weathered, light olive-brown (2.5Y 5/4) siltstone and shale chips; clay films and dark coatings on shale fragments; strongly acid.

Profile of Gilpin channery silt loam, 12 to 20 percent slopes, moderately eroded, 0.5 mile northeast of Oliveburg along Route 384 in Oliver Township. Sampled for characterization (profile S 58–Pa–33–6–(1–5). This profile shows some apparent mottling in the C1 horizon and has weaker structural development than the modal soil for this series.

Ap—0 to 7 inches, dark grayish-brown (2.5Y 4/2) channery silt loam; weak, fine, granular structure; friable when moist; neutral; abrupt, wavy boundary, 4 to 8 inches thick.

B1—7 to 13 inches, yellowish-brown (10YR 5/4) channery heavy silt loam; weak, fine, subangular blocky structure; friable when moist; thin clay films; neutral; clear, wavy boundary; 5 to 8 inches thick.

B2—13 to 19 inches, yellowish-brown (10YR 5/4) channery silty clay loam; weak to medium subangular blocky structure; friable when moist; thin clay films; neutral; clear, wavy boundary; 5 to 8 inches thick.

B3—19 to 27 inches, yellowish-brown (10YR 5/4) channery light silty clay loam with a few, fine, black coatings; weak, fine, subangular blocky structure with some layering; friable when moist; continuous clay films with a few coatings of manganese; strongly acid; abrupt, wavy boundary; 6 to 10 inches thick.

C1—27 to 40 inches, yellowish-brown (10YR 5/4) channery loam with strong-brown (7.5YR 5/8) and light brownish-gray (2.5Y 6/2) coatings on shale fragments; lenses of soil have fine, subangular blocky structure; friable when moist; strongly acid; lower boundary to bedrock is abrupt and wavy.

Guernsey series.—In this series are slightly acid or neutral, moderately deep or deep, moderately well drained or somewhat poorly drained Gray-Brown-Podzolic soils of the uplands. These soils are in areas where sandstone and shale are interbedded with thin beds of limestone. They are associated with the moderately deep, well-drained Westmoreland soils.

Typical profile of Guernsey silty clay loam, 3 to 8 percent slopes, moderately eroded, in a hayfield three-fourths of a mile north of Worthville.

Ap—0 to 6 inches, dark-brown (10YR 4/3) and dark yellowish-brown (10YR 4/4) silty clay loam; weak, thin, platy structure breaking to moderate, fine, granular; friable when moist; slightly sticky and slightly plastic when wet; slightly acid; abrupt, smooth boundary; 6 to 7 inches thick.

B1—6 to 10 inches, yellowish-brown (10YR 5/4) silty clay; moderate, fine, blocky structure; slightly plastic when wet; strongly acid; clear, wavy boundary; 4 to 5 inches thick.

B21g—10 to 14 inches, light brownish-gray (10YR 6/2) silty clay with common, fine, distinct mottles of strong brown (7.5YR 5/8) and very dark gray (N 3/0); moderate, medium, blocky structure; firm when moist, sticky and plastic when wet; strongly acid; clear, wavy boundary; 3 to 5 inches thick.

B22g—14 to 22 inches, gray (10YR 5/1) silty clay with common, fine distinct mottles of strong brown (7.5YR 5/8); weak, medium, blocky structure; very firm when moist, sticky and plastic when wet; strongly acid; clear, wavy boundary; 7 to 9 inches thick.

B23—22 to 31 inches, light-gray (N 7/0) silty clay with few, fine, distinct mottles of strong brown (7.5YR 5/8); very weak, thin, platy structure tending toward massiveness; firm when moist, very sticky and very plastic when wet; neutral; clear, wavy boundary; 8 to 10 inches thick.

B3—31 to 38 inches, light-gray (N 7/0) silty clay with a few, fine, distinct mottles of strong brown (7.5YR 5/8); weak, thin, platy structure tending toward massiveness; firm when moist, sticky and plastic when wet; neutral; clear, wavy boundary; 7 to 9 inches thick.

C1—38 to 50 inches +, light-gray (N 7/0) silty clay with a few, fine, distinct mottles of strong brown (7.5YR 5/8); dominantly massive but some prisms evident; firm when moist, sticky and plastic when wet; neutral.

The Guernsey soils range from 30 to 60 inches in depth over bedrock. Fragments of limestone 2 to 8 inches long and as much as 3 inches thick are common throughout the soil material. The texture of the subsoil ranges from silty clay to clay. These soils range from strongly acid near the surface to neutral in the lower part of the surface layer and in the upper part of the subsoil.

The structure of the subsoil changes from platy or blocky to weak, fine, granular when exposed to the weather and when thoroughly dried. This characteristic can be observed in a dry roadcut or in other excavations.

A claypan 14 to 16 inches below the surface slows the movement of water through these soils. In wet seasons this creates a condition favorable for slippage and landslides, especially in pastures.

Hartsells series.—In the Hartsells series are acid, deep, well-drained Red-Yellow Podzolic soils of the uplands. These soils developed in sandy material mixed with some material from siltstone and shale. They are associated with the well drained Dekalb, the moderately well drained Cookport, and the poorly drained Nolo soils. The Hartsells soils are mainly on broad, convex areas on the upper parts of slopes.

Typical profile of Hartsells loam, 5 to 12 percent slopes, moderately eroded, in a field formerly cultivated but now idle, 2 miles west of Roseville.

Ap1—0 to 4 inches, very dark grayish-brown (10YR 3/2) loam; moderate, very coarse, granular structure; friable when moist; 5 to 10 percent coarse fragments; numerous roots; very strongly acid; abrupt, wavy boundary; 4 to 6 inches thick.

Ap2—4 to 8 inches, dark-brown (10YR 4/3) loam; moderate, very coarse, granular structure; friable when moist, nonsticky when wet; 5 to 10 percent coarse fragments; incomplete mixing of reddish-yellow (7.5YR 6/6) material from the A2 horizon and material from the Ap1 horizon; numerous roots; very strongly acid; abrupt, wavy boundary; 3 to 5 inches thick.

A2—8 to 11 inches, reddish-yellow (7.5YR 6/6) silt loam; moderate, medium, platy structure; friable when moist, nonsticky when wet; 5 to 10 percent coarse fragments; numerous roots; very strongly acid; clear, wavy boundary; 2 to 4 inches thick.

B21—11 to 17 inches, strong-brown (7.5YR 5/8) silt loam with prominent particles of coarse sand; moderate, medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; 3 to 5 percent coarse fragments; thin, continuous clay films; strongly acid; clear, wavy boundary; 5 to 7 inches thick.

B22—17 to 25 inches, yellowish-brown (10YR 5/6) light silty clay loam with prominent particles of coarse sand; moderate, medium to coarse, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; 5 to 10 percent coarse fragments; thin, discontinuous clay films; contains a few roots; very strongly acid; clear, wavy boundary; 7 to 9 inches thick.

B23—25 to 36 inches, yellowish-brown (10YR 5/6) silty clay loam with particles of coarse sand; moderate, medium to coarse, subangular blocky structure; slightly firm when moist, slightly sticky and slightly plastic when wet; 10 to 15 percent coarse fragments; thin, discontinuous clay films; very strongly acid; abrupt, wavy boundary; 10 to 12 inches thick.

B24—36 to 44 inches, strong-brown (7.5YR 5/6) silty clay loam with few, fine, distinct mottles of pale brown (10YR 6/3); moderate, coarse, prismatic structure breaking to moderate, fine to medium, subangular blocky; hard when dry, very firm when moist, sticky and plastic when wet; thin, continuous clay films and a few, fine, black coatings; mottling is mainly on the faces of prisms; very strongly acid; clear, wavy boundary; 7 to 9 inches thick.

B3—44 to 48 inches, strong-brown (7.5YR 5/8) silty clay loam with common, medium, distinct mottles of light yellowish brown (2.5Y 6/4); coarse, prismatic structure breaking to moderate, fine to medium, subangular blocky; firm in place, sticky and plastic when wet; 5 to 10 percent coarse fragments; thin, discontinuous clay films; a few, fine, black coatings; very strongly acid.

C—48 inches +, stratified sandstone.

The depth of the Hartsells soils over bedrock ranges from 36 to 72 inches. In places fragments of sandstone, 2 to 4 inches long and as much as 3 inches thick, are present. In places there is a reddish-brown layer of silt loam, 8 to 12 inches below the surface. The texture of the subsoil ranges from heavy silt loam to silty clay loam. The structure of the subsoil ranges from weak platy to blocky.

Holston series.—Strongly acid, deep, well-drained Red-Yellow Podzolic soils intergrading toward Gray-Brown Podzolic soils are in the Holston series. These soils are underlain by stratified siltstone, sandstone, and clay. They are on benches in the major valleys of the county. The Holston soils are associated with the moderately well drained Monongahela soils.

Typical profile of Holston silt loam, 5 to 12 percent slopes, in a pasture that was formerly cultivated, 1 mile south of Baxter.

Ap—0 to 10 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable when moist; neutral (limed); clear, smooth boundary; 9 to 11 inches thick.

B1—10 to 42 inches, dark yellowish-brown (10YR 4/4) silty clay loam with streaks of yellowish brown (10YR 5/8); moderate, medium, subangular blocky structure; friable when moist; slightly acid (limed); gradual, wavy boundary; 31 to 35 inches thick.

B21—42 to 51 inches, yellowish-brown (10YR 5/4) silty clay loam; moderate, medium to coarse, subangular blocky structure; firm when moist; very strongly acid; clear, wavy boundary; 8 to 10 inches thick.

B22—51 to 62 inches +, yellowish-brown to light yellowish-brown (10YR 5/4 to 6/4) silty clay loam; weak, medium, subangular blocky structure; loose when moist; 80 percent sandstone fragments; thick, continuous clay coatings on the sandstone fragments; strongly acid.

In these soils bedrock is at a depth of 3 to 12 feet. The texture of the subsoil ranges from silty clay loam to sandy clay loam. In places the C horizon contains pockets of gravel, stratified sand, or gravel in a large bed. In some places there is a thin or weak fragipan deep in the profile. This pan is generally below a depth of 30 inches.

Leetonia series.—The Leetonia soils are strongly acid, moderately deep or deep, well-drained, sandy Podzols. They are in the uplands and are in areas where siliceous sandstone and conglomerate are the dominant underlying rock. Most of these soils are very stony. The Leetonia soils are associated with the well drained Dekalb soils and the moderately well drained Cookport soils.

Typical profile of Leetonia very stony sandy loam, 0 to 12 percent slopes, in a wooded area about 1 mile east of Hays Lot Fire Tower.

A00—3 inches to 1 inch, hardwood leaf litter and twigs.

A0—1 inch to 0, black, matted, partly decayed organic matter.

A1—0 to 2 inches, black (10YR 2/1) sandy loam; structureless; loose when moist; strongly acid; abrupt, smooth boundary; 1½ to 2 inches thick.

A2—2 to 7 inches, gray (5YR 5/1) and pinkish-gray (5YR 6/2) sandy loam; structureless; loose when moist; 30 to 50 percent coarse fragments; very strongly acid; clear, irregular boundary; 4 to 6 inches thick.

Bir—7 to 9 inches, dark reddish-brown (2.5YR 2/4) sandy loam; weak, fine, granular structure; very friable when moist; strongly acid; clear, wavy boundary; 2 to 3 inches thick.

B2—9 to 32 inches, dark yellowish-brown (10YR 4/4) sandy loam; weak, thin to medium, platy and weak, fine, granular structure; very friable when moist; 40 to 70 percent coarse fragments; very strongly acid; clear, wavy boundary; 22 to 24 inches thick.

C—32 to 45 inches +, yellowish-brown (10YR 5/8) loamy coarse sand; single grain; loose when moist; 60 to 90 percent coarse fragments; very strongly acid.

Depth to bedrock ranges from 20 to 48 inches. In some places the Bir horizon ranges from ½ inch to 4 inches in thickness. The leached A2 horizon ranges from 2 to 12 inches in thickness, and tongues reach to a depth of 18 inches or more.

Profile of Leetonia very stony sandy loam, 12 to 35 percent slopes, in a wooded area about 1.2 miles east of Clear Creek State Park, along the dirt road to Beartown Rocks in Heath Township. Sampled for characterization (profile S 58–Pa–33–11–(1–6)). This profile has a thinner A2 horizon than the modal Leetonia very stony sandy loam has over its broad range, but it is representative of the Leetonia soils in this county. Many sandstone boulders as large as 6 feet in diameter are on the surface.

A0—2 inches to 0, black (N 2/0) organic matter and decayed leaves; 10 percent quartz grains; 20 percent fragments from ½ inch to 3 inches in diameter; very strongly acid; abrupt, smooth boundary; 0 to 2 inches thick.

A2—0 to 4 inches, light brownish-gray (10YR 6/2) loamy sand, weak, fine, granular structure; very friable; 80 percent stone fragments; very strongly acid; abrupt, irregular boundary; 2 to 8 inches thick.

B1—4 to 8 inches, dark yellowish-brown (10YR 4/4) to yellowish-brown (10YR 5/4) sandy loam, weak, fine, subangular blocky structure; friable when moist; 85 percent stone fragments from 6 to 12 inches in diameter; very strongly acid; clear, wavy boundary; 3 to 5 inches thick.

B2—8 to 15 inches, yellowish-brown (10YR 5/4) light sandy loam; weak, fine, subangular blocky structure; friable when moist; 90 percent stone fragments as much as 12 inches in diameter; strongly acid; clear, wavy boundary; 5 to 10 inches thick.

C1—15 to 26 inches, brown (10YR 5/3) light sandy loam with small clay lenses; single grain held together loosely with clay films; loose when moist; 95 percent stone fragments ranging from 6 to 18 inches in diameter; coatings on the upper sides of rocks; very strongly acid; gradual, irregular boundary; 8 to 12 inches thick.

C2—26 to 36 inches, yellowish-brown (10YR 5/4) loamy fine sand, single grain; friable when moist, when removed, but slightly firm in place; 98 percent stone fragments from 6 to 24 inches in diameter; grains of sand lightly joined by clay; strongly acid.

Monongahela series.—The Monongahela soils are acid, deep, and moderately well drained, and they have a fragipan. They are Red-Yellow Podzolic soils intergrading toward Gray-Brown Podzolic soils. These soils are on benches in the valleys of streams where there are deep deposits of stratified alluvium that has been in place for a long time. The soils are associated with the well-drained Holston soils and the somewhat poorly drained Tyler soils.

Typical profile of Monongahela silt loam, 0 to 3 percent slopes, in a cultivated field one-fourth mile east of Worthville.

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; friable when moist; 1 to 2 percent coarse fragments; numerous roots; moderately acid; abrupt, smooth boundary; 6 to 7 inches thick.

B1—7 to 11 inches, yellowish-brown (10YR 5/4) heavy silt loam; dark grayish-brown (10YR 4/2) coatings on the peds and in filled pores; weak, fine, medium subangular blocky structure breaking to weak, medium, platy; friable when moist, nonsticky and slightly plastic when wet; 1 percent coarse fragments; few, thin, discontinuous coatings of clay and silt on peds; numerous roots; moderately acid; clear, wavy boundary; 3 to 5 inches thick.

B21—11 to 16 inches, yellowish-brown (10YR 5/4) heavy silt loam; moderate, medium, subangular blocky breaking to moderate, medium, platy structure; slightly firm when moist, slightly sticky and slightly plastic when wet; 1 percent coarse fragments; thin, discontinuous clay films on the faces of peds; numerous roots; slightly acid; clear, wavy boundary; 4 to 6 inches thick.

B22g—16 to 26 inches, yellowish-brown (10YR 5/4) and dark yellowish-brown (10YR 4/4) heavy silt loam with common, fine, distinct mottles of light olive brown (2.5Y 5/4) and strong brown (7.5YR 5/6); weak, coarse, prismatic structure breaking to weak, medium, subangular blocky; slightly firm when moist, slightly sticky and slightly plastic when wet; 2 to 5 percent coarse fragments; a few, thin, discontinuous clay films in pores and on peds; few roots; slightly acid; clear, wavy boundary; 9 to 11 inches thick.

B23gm—26 to 32 inches, dark-brown (10YR 4/3) gravelly sandy loam with few, fine, distinct mottles of strong brown (7.5YR 5/6) and light brownish gray (2.5Y 6/2); weak, thin, platy structure with some massiveness; very firm when moist, nonsticky and nonplastic when wet; 80 percent coarse fragments: few, thin, black coatings; few thin clay films on small pebbles; few roots; slightly acid abrupt, wavy boundary; 5 to 7 inches thick.

B24g—32 to 41 inches, strong-brown (7.5YR 5/6) very fine sandy loam with many, coarse, prominent mottles of grayish brown (2.5Y 5/2), dark brown (7.5YR 4/4), and brown (10YR 5/3); weak, coarse, prismatic structure breaking to weak, medium, platy; slightly firm in place, friable when moist but nonsticky and nonplastic when wet; 5 percent coarse fragments; few, thin, discontinuous clay films in pores and thin, black coatings; few roots; slightly acid; abrupt, wavy boundary; 8 to 10 inches thick.

D—41 to 46 inches +, dark grayish-brown (7.5YR 4/2) very gravelly sandy loam with many fine, distinct mottles of yellowish red (5YR 4/6) and light olive brown (2.5Y 5/4); massive structure; very firm in place; 80 to 90 percent coarse fragments; thin clay films on pebbles; few roots; slightly acid.

The depth to bedrock in the Monongahela soils ranges from 5 to 15 feet. The color of the subsoil ranges from yellowish brown to dark brown, and it is light olive brown in the lower part of the profile. The texture of the subsoil ranges from heavy silt loam to gravelly and sandy loam.

Montevallo series.—The Montevallo soils are acid, shallow or very shallow, well-drained Lithosols that are intergrading toward Sols Bruns Acides. They are in the uplands. They are underlain by stratified siltstone, shale, and sandstone. These soils are associated with the moderately deep to shallow, well-drained Gilpin soils. The Montevallo soils are mainly steep or moderately sloping. A large part of the acreage is severely eroded.

Typical profile of Montevallo shaly silt loam, 20 to 35 percent slopes, moderately eroded, in a formerly cultivated field, now idle, 2 miles northwest of Stanton. Sampled for characterization (profile S 58–Pa–33–4–(1–4)). Modal Montevallo shaly silt loam.

Ap—0 to 6 inches, yellowish-brown (10YR 5/4) shaly heavy silt loam; weak, fine, granular structure; friable when moist; 20 percent shale chips; moderately acid; abrupt, smooth boundary; 5 to 7 inches thick.

B—6 to 8 inches, light yellowish-brown (10YR 6/4) shaly silty clay loam; weak, fine to medium, subangular blocky structure; friable when moist; 30 percent shale chips; strongly acid; abrupt, irregular boundary; 1 to 4 inches thick.

C1—8 to 12 inches, light yellowish-brown (10YR 6/4), partly weathered shale coated with silty clay loam; easily broken shale chips; clay coatings are thick and discontinuous; some clay lenses; 80 to 90 percent shale chips; strongly acid; clear, smooth boundary; 3 to 5 inches thick.

C2—12 to 19 inches, light yellowish-brown (10YR 6/4) and strong-brown (7.5YR 5/6), partly weathered shale; clay coatings thin and discontinuous; dark coatings on shale fragments strongly acid.

The Montevallo soils range from 8 to 30 inches in depth over bedrock. Most of these soils have been eroded, and the Ap horizon consists of material from the original B horizon and from the surface layer mixed together. The B horizon is thin and discontinuous. The Ap horizon, in some places, rests on the C horizon. The texture of the B horizon is very shaly silt loam or very shaly silty clay loam. In many places there is not enough clay in the subsoil to make a textural B horizon.

Profile of Montevallo shaly silt loam, 20 to 35 percent slopes, moderately eroded, in an idle field 7 miles south of Brookville to a dirt road and southeast 0.7 mile to an abandoned farm in Oliver Township. Sampled for characterization (profile S 58–Pa–33–14–(1–3)). Modal Montevallo shaly silt loam.

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) shaly silt loam; weak, fine, granular structure; very friable when moist; 50 percent shale fragments; very strongly acid; abrupt, smooth boundary; 7 to 8 inches thick.

B3—8 to 12 inches, yellowish-brown (10YR 5/4) channery silt loam; weak, fine, subangular blocky structure; friable when moist; 85 percent coarse fragments with prominent clay films; strongly acid; clear, irregular boundary; 2 to 7 inches thick.

C1—12 to 21 inches, yellowish-brown (10YR 5/4) silt loam coatings on rock fragments; 95 to 98 percent rock fragments with partial clay films; strongly acid; clear, irregular boundary.

Nolo series.—In this series are strongly acid, deep, poorly drained or somewhat poorly drained Low-Humic Gley soils of the uplands. These soils are underlain by sandstone that is generally mixed with some interbedded shale. They are associated with the moderately deep, well drained Dekalb, the deep, well drained Hartsells, and the deep, moderately well drained or somewhat poorly drained Cookport soils. The Nolo soils are mainly on nearly level or slightly concave slopes.

Typical profile of Nolo silt loam, 0 to 3 percent slopes, in a wooded area 1.3 miles east of Sigel along the road to Clear Creek State Park.

A00—2½ inches to 1 inch, forest litter consisting of undecomposed oak and blackhaw leaves and a moss mat.

A0—1 inch to 0, partly decomposed leaf litter and matted roots.

A1—0 to 3 inches, very dark gray (10YR 3/1) silt loam; weak, fine, granular structure; very friable when moist; very strongly acid; clear, wavy boundary; 2½ to 4 inches thick.

A2—3 to 8 inches, gray (10YR 6/1) and dark-gray (10YR 4/1) fine sandy loam; weak, fine to medium, subangular blocky structure; friable when moist; numerous roots; very strongly acid; gradual, wavy boundary; 4 to 8 inches thick.

B1g—8 to 17 inches, light brownish-gray (10YR 6/2) gritty silty clay loam with few, fine, distinct mottles of dark gray (10YR 4/1) and strong brown (7.5YR 5/8); weak, medium, subangular blocky structure with some weak platiness; friable when moist, sticky and plastic when wet; numerous roots; very strongly acid; gradual, irregular boundary; 5 to 10 inches thick.

B21g—17 to 22 inches, light brownish-gray (10YR 6/2) silty clay loam with common, medium, distinct mottles of strong brown (7.5YR 5/8); weak, medium, platy with some weak, fine, subangular blocky structure; when moist, firm in place but brittle when removed; sticky and plastic when wet; few roots; very strongly acid; clear, wavy boundary; 4 to 6 inches thick.

B22g—22 to 28 inches, light brownish-gray (10YR 6/2) silty clay loam with common, coarse, distinct mottles of strong brown (7.5YR 5/8); moderate, medium to thick, platy structure; firm in place when moist, sticky and plastic when wet; few roots; very strongly acid; clear, wavy boundary; 5 to 7 inches thick.

B3—28 to 35 inches, gray (10YR 6/1) silty clay loam with many, coarse, distinct mottles of strong brown (7.5YR 5/8); moderate, medium to coarse, subangular blocky structure breaking to weak, medium, platy; firm when moist, sticky and plastic when wet; few roots; strongly acid; clear, wavy boundary; 7 to 9 inches thick.

C—35 to 46 inches +, gray (10YR 6/1) gritty silt loam with common, medium, distinct mottles of yellowish brown (10YR 5/8); moderate, medium to thick, platy structure; firm in place when moist, slightly sticky and slightly plastic when wet; many black coatings; very strongly acid.

Depth to bedrock in the Nolo soils ranges from 30 to 60 inches. The texture of the subsoil ranges from silty clay loam to heavy silt loam. These soils have a moderately developed fragipan 16 to 20 inches below the surface.

Philo series.—This series consists of acid, deep, moderately well drained or somewhat poorly drained Alluvial soils of flood plains that are subject to frequent flooding. These soils were developed in unconsolidated deposits of alluvium derived from sandstone, siltstone, and shale of the uplands. They are associated with the well-drained Pope soils and the poorly drained Atkins soils.

Typical profile of Philo silt loam in a wooded area along Little Sandy Creek 1 mile west of Worthville.

A00—2 inches to 0, loose layer of twigs and leaves.
A1—0 to 10 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable when moist, nonsticky and nonplastic when wet; numerous fibrous roots; strongly acid; abrupt, smooth boundary; 10 to 11 inches thick.
C1—10 to 24 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, medium, subangular blocky structure; very friable when moist, nonsticky and nonplastic when wet; strongly acid; clear, wavy boundary; 13 to 15 inches thick.
C2g—24 to 42 inches, light brownish-gray (10YR 6/2) heavy silt loam with many, fine, distinct mottles of strong brown (7.5YR 5/8) and yellowish red (5YR 4/8) heavy silt loam; weak, medium to thick, platy structure breaking to weak, medium, subangular blocky; friable when moist, slightly sticky and slightly plastic when wet; strongly acid; clear, wavy boundary; 17 to 19 inches thick.
C3—42 inches +, light brownish-gray (2.5Y 6/2), stratified sandy loam with many, medium, distinct mottles of yellowish red (5YR 5/8) and strong brown (7.5YR 5/8); structureless; loose when moist; strongly acid.

The depth of the Philo soils ranges from 3 to 10 feet. The texture of the subsoil ranges from silt loam to silty clay loam. In some areas underlain by coarse-grained sandstone, however, much of the profile is sandy. In places these soils are underlain by sand and gravel at a depth of 3 or 4 feet.

Pope series.—This series consists of acid, deep, well-drained Alluvial soils of flood plains that are subject to frequent flooding. These soils developed in unconsolidated alluvium from mixed sandstone, siltstone, and shale of the uplands. They are associated with the moderately well drained or somewhat poorly drained Philo soils and the poorly drained Atkins soils.

Typical profile of Pope silt loam in an idle field along a powerline right-of-way, along Mahoning Creek at Bells Mills.

A1—0 to 3 inches, black (N 2/1) silt loam; weak, fine, granular structure; very friable when moist; very strongly acid; abrupt, smooth boundary; 3 to 4 inches thick.
A2—3 to 9 inches, dark-brown (7.5YR 3/2) silt loam; weak, thin, platy structure; very friable when moist, slightly sticky and slightly plastic when wet; very strongly acid; clear, wavy boundary; 5 to 7 inches thick.
C1—9 to 39 inches, dark-brown (7.5YR 4/4) and dark reddish-brown (5YR 3/4) silt loam; weak, coarse, prismatic structure breaking to weak, medium, platy; friable when moist, slightly sticky and slightly plastic when wet; thin, discontinuous clay coatings; very strongly acid; gradual, wavy boundary; 28 to 32 inches thick.
C2—39 to 57 inches, strong-brown (7.5YR 5/6) silt loam with many, medium to coarse, prominent mottles of gray (5Y 6/1) and yellowish red (5YR 4/8); weak, coarse, prismatic structure breaking to weak, medium, platy; friable when moist, slightly sticky and slightly plastic when wet; thin, discontinuous clay coatings; gravel bed at a depth of 72 to 76 inches; strongly acid.

The Pope soils range from 3 to 10 feet in depth. The texture and color of the subsoil vary, depending upon the characteristics of the soils in the watershed above them.

Purdy series.—The Purdy soils are acid, deep, poorly drained Low-Humic Gley soils that are intergrading toward Planosols. They were developed in stratified deposits of clay and silt on old stream terraces. These soils are associated with the moderately well drained Monongahela soils and the somewhat poorly drained Tyler soils.

Typical profile of Purdy silt loam in an idle field three-fourths mile north of Cloe.

A1—0 to 3 inches, very dark gray (10YR 3/1) silt loam; weak, fine, granular structure; friable when moist; moderately acid; clear, wavy boundary; 2 to 3 inches thick.
A2—3 to 9 inches, dark grayish-brown (2.5Y 4/2) silt loam; weak, medium, platy structure breaking to weak, medium, subangular blocky; friable when moist, slightly sticky and slightly plastic when wet; many wormholes; slightly acid; clear, wavy boundary; 5 to 7 inches thick.
B1—9 to 13 inches, dark grayish-brown (2.5Y 4/2) silt loam with few, fine, distinct mottles of gray (5Y 5/1); weak, medium blocky structure; friable when moist, slightly sticky and slightly plastic when wet; thin, continuous clay coatings; many charcoal fragments; medium acid; gradual, wavy boundary; 2 to 4 inches thick.
B21g—13 to 21 inches, gray (5Y 5/1) silty clay loam with many, medium, distinct mottles of yellowish red (5YR 5/8); moderate, medium blocky structure; slightly firm when moist, sticky and plastic when wet; thick, continuous clay coatings on the faces of peds; many charcoal fragments; medium acid; clear, wavy boundary; 7 to 9 inches thick.
B22g—21 to 29 inches, gray (5Y 5/1) clay loam with many, coarse, distinct mottles of yellowish red (5YR 5/8) and few, fine, distinct mottles of reddish brown (2.5YR 5/4) and dark gray (N 4/0); moderate, medium, prismatic structure breaking to moderate, medium blocky; friable when moist, sticky and plastic when wet; medium acid; many black coatings; clear, wavy boundary; 7 to 9 inches thick.
B23g— 29 to 37 inches, gray (5Y 5/1) clay loam with many, medium, distinct mottles of yellowish red (5YR 5/8) and yellowish brown (10YR 5/8); moderate, coarse, blocky and moderate, coarse, prismatic structure; firm when moist, sticky and plastic when wet; numerous clay pockets and black coatings; strongly acid; clear, wavy boundary; 7 to 9 inches thick.
B3g—37 to 52 inches, gray (N 6/0) clay with many, coarse, distinct mottles of strong brown (7.5YR 5/8) and few, fine, distinct mottles of yellowish red (5YR5/8); moderate, medium, prismatic structure breaking to moderate, medium, blocky; very firm when moist, very sticky and plastic when wet; thick, continuous clay coatings on the faces of prisms, numerous black coatings; very strongly acid; abrupt, smooth boundary; 14 to 15 inches thick.
Cg—52 to 60 inches +, gray (5Y 5/1) clay loam with few, fine, distinct mottles of yellowish red (5YR 5/8) and red (2.5YR 4/8); moderate, medium, subangular blocky structure; slightly gritty; several black coatings; very strongly acid.

The Purdy soils range from 3 to 12 feet in depth over bedrock. The subsoil is gray to bluish gray but has strong mottles of yellowish red and reddish brown. Thick pockets of clay and silt are common in the subsoil. The texture of these soils ranges from silt loam to silty clay loam and clay. Stratified sand and gravel are present in places in the B and C horizons.

Sequatchie series.—In the Sequatchie series are acid, deep, well-drained soils on low terraces that are subject to occasional overflow. The soils are in the Gray-Brown Podzolic great soil group and are intergrading toward Alluvial soils. They are associated with the Pope, Philo, and Atkins soils of the flood plains and with the Holston and Monongahela soils of the higher terraces. The Sequatchie soils are intermediate between the Holston and Pope soils in degree of profile development and in horizon differentiation.

Typical profile of Sequatchie silt loam, 0 to 5 percent slopes, in a cultivated field along Red Bank Creek at Heathville.

Ap—0 to 9 inches, dark yellowish-brown (10YR 3/4) silt loam; weak, fine, granular structure; very friable when moist; medium acid (limed); gradual, smooth boundary; 7 to 11 inches thick.

B1—9 to 24 inches, yellowish-red (5YR 4/8) silt loam; weak, medium to coarse, subangular blocky structure; very friable when moist; medium acid (limed); gradual, smooth boundary; 12 to 17 inches thick.

B2—24 to 39 inches, strong-brown (7.5YR 5/6 to 5/8) silt loam; weak, medium, subangular blocky structure; very friable when moist; strongly acid; clear, wavy boundary; 14 to 16 inches thick.

C—39 to 42 inches +, yellowish-brown (10YR 5/8) fine sand; structureless; loose when moist; strongly acid.

The Sequatchie soils range from 4 to 15 feet in depth over bedrock. The texture of the surface layer ranges from silt loam to loamy fine sand. In places the texture of the B horizon is silty clay loam instead of silt loam. In places material in the substratum consists partly of gravel or of rock beds.

Shelocta series.—In the Shelocta series are acid, deep, well-drained Gray-Brown Podzolic soils that intergrade toward Red-Yellow Podzolic soils. These soils are in deep deposits of colluvial material. They are associated with the moderately well drained or somewhat poorly drained Ernest soils and with the poorly drained Brinkerton soils.

Typical profile of Shelocta silt loam, 3 to 8 percent slopes, moderately eroded, 1 mile north of Sugar Hill in a cultivated field where some extra surface soil has been deposited.

Ap—0 to 11 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; friable when moist, nonsticky and nonplastic when wet; 5 percent coarse fragments; numerous roots; moderately acid; clear, wavy boundary; 10 to 12 inches thick.

A3—11 to 23 inches, dark yellowish-brown (10YR 3/4) silt loam; weak, fine to medium, subangular blocky and weak, thin, platy structure; friable when moist, nonsticky and nonplastic when wet; 5 percent coarse fragments; few roots below a depth of 17 inches; thin coatings of clay on peds; strongly acid; clear, wavy boundary; 11 to 13 inches thick.

B2—23 to 39 inches, yellowish-brown (10YR 5/6) silty clay loam; weak, medium, subangular blocky structure; firm when moist, sticky and plastic when wet; 15 percent coarse fragments; few roots; thin coatings of clay on peds; strongly acid; clear, wavy boundary; 15 to 17 inches thick.

B3–39 to 51 inches, yellowish-brown (10YR 5/6 to 5/8) silty clay loam; weak, thick to medium, platy structure tending toward massiveness; firm when moist, sticky and plastic when wet; 65 percent coarse fragments; thin coatings of clay on peds; strongly acid; clear, wavy boundary; 11 to 13 inches thick.

C—51 inches +, yellowish-brown (10YR 5/4) silt loam; structureless; very friable when moist, nonsticky and nonplastic when wet; 95 percent coarse shale fragments; strongly acid.

The soils of the Shelocta series range from 3 to 20 feet in depth over bedrock. The texture of the subsoil ranges from silt loam to silty clay loam or clay loam.

Tyler series.—In this series are acid, deep, somewhat poorly drained Red-Yellow Podzolic soils intergrading toward Planosols. These soils developed in stratified clay and silt deposited on terraces by streams. They are associated with the moderately well drained Zoar and the poorly drained Purdy soils.

Typical profile of Tyler silt loam, in a wooded area once cultivated, one-half mile east of Sykesville.

A1—0 to 3 inches, dark-gray (10YR 4/1) silt loam; weak, fine, granular structure; friable when moist; numerous roots; very strongly acid; abrupt, wavy boundary; 2 to 3 inches thick.

A2—3 to 10 inches, yellowish-brown (10YR 5/4) heavy silt loam; moderate, thin, platy structure; friable when moist, slightly sticky and slightly plastic when wet; numerous roots; very strongly acid; clear, wavy boundary; 6 to 8 inches thick.

B21g—10 to 28 inches, gray (10YR 6/1) silty clay loam with many, medium, distinct mottles of reddish yellow (7YR 6/8) and common, fine, faint mottles of yellow (10YR 7/6); moderate, medium blocky structure; firm when moist, slightly sticky and slightly plastic when wet; few roots to a depth of 15 inches; very strongly acid; clear, wavy boundary; 17 to 19 inches thick.

B22g—28 to 36 inches, pale-brown (10YR 6/3) silty clay loam with many, medium, distinct mottles of strong brown (7.5YR 5/6) and yellowish red (5YR 5/6) and few, medium, distinct mottles of yellowish brown (10YR 5/8); moderate, medium blocky structure; firm when moist, slightly sticky and slightly plastic when wet; few black coatings on peds; very strongly acid; clear, wavy boundary; 7 to 9 inches thick.

B3g—36 to 42 inches, yellowish-brown (10YR 5/8) silty clay loam with many, medium, distinct mottles of yellowish red (5YR 5/6); massive; firm in place when moist; few black coatings; very strongly acid.

C—42 to 50 inches +, stratified silt and clay.

The Tyler soils range from 3 to 12 feet in depth. Below a depth of 12 inches, the soil is plastic, tight, and slowly permeable when moist. During extremely dry periods, this soil frequently develops large cracks. In woods and old pastures, the surface of this soil is hummocky in many places. It is better drained on the knolls than in the depressions.

Upshur series.—This series consists of neutral to medium acid, deep or moderately deep, well-drained Gray-Brown Podzolic soils of the uplands. These soils were developed in material weathered from slightly calcareous to moderately calcareous, red clay shale. In this county they occupy small areas and are mingled with the Gilpin soils.

The following profile is typical of the small areas of Upshur soils associated with the Gilpin soils as they occur in the complex mapped in the vicinity of Stump Creek, about 2 miles south of Sykesville.

Ap—0 to 6 inches, reddish-brown (5YR 4/4) silty clay loam; weak, fine, granular structure; friable when moist, slightly sticky and slightly plastic when wet; moderately acid; clear, smooth boundary; 5 to 7 inches thick.

B21—6 to 11 inches, dark reddish-brown to reddish-brown (2.5YR 3/4 to 4/4) silty clay loam; moderate, coarse, subangular blocky structure; firm when moist; sticky and plastic when wet; strongly acid; abrupt, wavy boundary; 4 to 5 inches thick.

B22—11 to 18 inches, weak-red (2.5YR 4/2) silty clay loam; moderate, coarse to medium blocky structure; firm when moist, sticky and plastic when wet; strongly acid; clear, wavy boundary; 6 to 8 inches thick.

B23—18 to 34 inches, dusky-red (2.5YR 3/2) silty clay; moderate, coarse to medium blocky structure; firm when moist, sticky and plastic when wet; strongly acid; clear, wavy boundary; 15 to 17 inches thick.

C—34 to 38 inches +, dusky-red (2.5YR 3/2) silty clay spotted with light gray (7.5YR 7/1); massive; very firm; strongly acid.

The texture of the surface layer ranges from silt loam to silty clay. The texture of the subsoil ranges from silty clay loam to clay. Depth to unweathered shale ranges from 18 to 42 inches.

Wellston series.—This series consists of acid, deep, well-drained soils of the uplands. These soils are classified as intergrades between Gray-Brown Podzolic soils and Red-Yellow Podzolic soils. They developed in silty material mixed with some material from sandstone and shale. They are associated with the moderately deep Gilpin soils.

Typical profile of Wellston silt loam, 12 to 20 percent slopes, moderately eroded, in a cultivated cornfield 2 miles south of Corsica.

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; very friable when moist; medium acid; clear, wavy boundary; 8 to 10 inches thick.

B1—9 to 17 inches, dark-brown (10YR 4/3) silt loam; weak, fine, subangular blocky structure breaking to weak, fine, granular; friable when moist, nonsticky when wet; medium acid; abrupt, wavy boundary; 8 to 9 inches thick.

B2—17 to 28 inches, dark-brown (7.5YR 4/4) silty clay loam; weak, medium and fine, subangular blocky structure; firm when moist, sticky and slightly plastic when wet; thin, discontinuous clay films on the faces of peds; medium acid; clear, wavy boundary; 10 to 12 inches thick.

B3—28 to 36 inches, yellowish-brown (10YR 5/4 to 5/6) silty clay loam, weak, medium and fine, subangular blocky structure; friable to slightly firm when moist, sticky and slightly plastic when wet; thin, continuous clay films on the faces of peds; medium acid; clear, wavy boundary; 7 to 9 inches thick.

C—36 to 40 inches +, yellowish-brown (10YR 5/6) silt loam; very weak, medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; thin, continuous clay films on the faces of peds; strongly acid.

The soils of the Wellston series range from 30 to 48 inches in depth, but they are mainly about 36 to 40 inches deep. The texture of the subsoil ranges from silt loam to silty clay loam. There is a distinct horizon of clay accumulation in the subsoil. The B horizon ranges from 18 to 30 inches in thickness. In some places soft, weathered, shale chips are scattered throughout the profile.

Westmoreland series.—In this series are neutral to medium acid, moderately deep or deep, well-drained soils of the uplands. The soils are in the Gray-Brown Podzolic great soil group but are intergrading toward Red-Yellow Podzolic soils. They are underlain by stratified shale, siltstone, sandstone, and thin-bedded limestone. The Westmoreland soils are associated with the moderately well drained or somewhat poorly drained Guernsey soils.

Typical profile of Westmoreland silt loam, 12 to 20 percent slopes, moderately eroded, in a cultivated field 1½ miles north of Big Run.

Ap—0 to 7 inches, dark-brown (10YR 3/3) silt loam; weak, fine, granular structure; friable when moist, nonsticky and nonplastic when wet; numerous roots; 10 percent coarse fragments; slightly acid; abrupt, wavy boundary; 7 to 9 inches thick.

B1—7 to 15 inches, dark yellowish-brown (10YR 4/4) silty clay loam; weak, medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; numerous roots; 10 percent coarse fragments; thin clay coatings on peds; medium acid; clear, wavy boundary; 7 to 9 inches thick.

B21—15 to 27 inches, yellowish-brown (10YR 5/8) silty clay loam; weak, medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; few roots; 20 percent coarse fragments; thin clay coatings on peds; medium acid; clear, wavy boundary; 8 to 10 inches thick.

B22—27 to 36 inches, yellowish-brown (10YR 5/4) shaly silty clay loam; weak, fine to medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; thin clay coatings on peds; medium acid; clear, wavy boundary; 8 to 10 inches thick.

C—36 to 39 inches, yellowish-brown (10YR 5/4) channery silt loam; massive; friable when moist, nonsticky and nonplastic when wet; medium acid.

The Westmoreland soils range from 2 to 6 feet in depth over bedrock. The texture of the subsoil ranges from silty clay loam to clay. Where the bedrock is sandstone, the texture is gritty below the B horizon.

Wharton series.—Acid, moderately deep or deep, moderately well drained or well drained soils of the uplands make up this series. The soils are in the Red-Yellow Podzolic great soil group but are intergrading toward Gray-Brown Podzolic soils. These soils are underlain by clay shale that is generally mixed with some siltstone and thin-bedded sandstone. They are associated with the somewhat poorly drained Cavode and the poorly drained Armagh soils. The Wharton soils are moderately sloping. They are mainly on convex ridgetops.

Typical profile of Wharton silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated field 2 miles southeast of Dora.

Ap—0 to 5 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; friable when moist; slightly acid (limed); abrupt, wavy lower boundary; 4 to 6 inches thick.

B21—5 to 11 inches, yellowish-brown (10YR 5/6) silty clay loam; moderate, fine to medium, subangular blocky structure; friable when moist, sticky and plastic when wet; thin, partial clay films on peds and in pores; slightly acid (limed); clear, wavy lower boundary; 4 to 7 inches thick.

B22—11 to 19 inches, yellowish-brown (10YR 5/6) silty clay loam; moderate, fine and medium, subangular blocky structure; friable to firm when moist, sticky and plastic when wet; about 2 percent coarse fragments with thin, continuous clay films on peds; strongly acid; gradual, wavy lower boundary; 7 to 10 inches thick.

B3—19 to 23 inches, yellowish-brown (10YR 5/4) shaly silty clay loam with few, fine, distinct mottles of grayish brown and strong brown; weak, medium, platy structure breaking to fine blocky structure; firm when moist, sticky and plastic when wet; about 10 percent shale fragments with thin, continuous clay films on the peds and fragments of shale; strongly acid; abrupt, wavy lower boundary; 4 to 6 inches thick.

C1—23 to 29 inches, light-olive (2.5Y 5/4) shaly light silty clay loam with common, fine, distinct mottles of grayish brown and strong brown; weak, thin, platy structure; firm when moist, slightly sticky and slightly plastic when wet; about 50 percent shale chips with thin, partial clay films on peds; very strongly acid; abrupt, wavy lower boundary; 5 to 7 inches thick.

C2—29 to 34 inches, dark grayish-brown (10YR 4/2) shaly light silty clay loam; very weak, thick, platy structure and massive; firm to very firm when moist, slightly sticky and slightly plastic when wet; contains a few fragments of coal; partial clay films in pores and numerous black coatings; very strongly acid.

The Wharton soils range from 23 to 60 inches in depth over bedrock. The subsoil ranges from yellowish brown to dark grayish brown and strong brown. The structure of the B horizon ranges from blocky to platy at increasing depths.

Zoar series.—This series consists of acid, deep, moderately well drained or well drained Red-Yellow Podzolic soils intergrading toward Gray-Brown Podzolic soils.

These soils were developed in stratified clay and silt deposited on stream terraces that are not subject to flooding by present streams. They are associated with the somewhat poorly drained Tyler soils and the poorly drained Purdy soils.

Typical profile of Zoar silt loam, 0 to 3 percent slopes, in a hayfield 0.8 mile southeast of Worthville along the road to Sprankle Mills.

Ap—0 to 9 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, thin, platy structure; friable when moist, nonsticky and nonplastic when wet; slightly acid (limed); clear, wavy boundary; 8 to 10 inches thick.

B21—9 to 25 inches, yellowish-brown (10YR 5/8) silty clay loam; moderate, medium blocky structure; slightly firm when moist, slightly sticky and slightly plastic when wet; medium acid; clear, wavy boundary; 14 to 16 inches thick.

B22—25 to 36 inches, yellowish-brown (10YR 5/6) silty clay loam with many, coarse, distinct mottles of strong brown (7.5YR 5/8) and light brownish gray (10YR 6/2); weak, thin, platy and weak, moderate blocky structure; friable to firm when moist, slightly sticky and slightly plastic when wet; many black coatings; strongly acid; clear, wavy boundary; 10 to 12 inches thick.

Cg—36 to 42 inches, strong-brown (7.5YR 5/8) silty clay loam with many, coarse, distinct mottles of dark yellowish brown (10YR 3/4) and yellowish brown (10YR 5/4); moderate, medium, blocky structure; friable to firm when moist, slightly sticky and slightly plastic when wet; very strongly acid.

The Zoar soils range from 3 to 12 feet in depth over bedrock. The texture of the subsoil ranges from silt loam to silty clay loam and clay. In the lower part of the subsoil and in the substratum the color is stronger gray in places and the consistence is firmer than in the profile described.

Laboratory Data[5]

Table 9 shows physical and chemical properties of selected soils in Jefferson County. Most of the soils were sampled at two sites. Typical sites were selected of each soil as it occurs in the county, and the sites were in areas of the most common land use for the particular soil. The samples were collected from each horizon that could be recognized in a pit dug through the solum and into the parent material.

The coarse fragments, reported in table 9 as percent by weight, are all fragments over 2 millimeters in diameter found in bulk samples of approximately 4 quarts, but they do not include large fragments, which were left in the field. The particle-size distribution was determined by methods developed by V. J. Kilmer and L. T. Alexander (*5*) and by V. J. Kilmer and J. F. Mullins (*6*).

The textural classes shown in table 9 are based on strict application of the texture chart to the analyses of material finer than 2 millimeters. They do not always agree with textures named in field descriptions. For most horizons of the soils sampled, bulk density was determined by the core method. Duplicate 2-inch by 1-inch cores were taken with the Salinity Laboratory sampler. Moisture retained at a tension of 1/3 atmosphere was determined on core samples taken with the Salinity Laboratory sampler. Moisture retained at 15 atmospheres tension was determined on fragmented samples.

Organic carbon and exchangeable cations were determined by a method developed by Michael Peech, L. T. Alexander, L. A. Dean, and J. F. Reed (*8*). Nitrogen was determined by the Kjeldahl method.

Clay minerals were determined by X-ray diffraction on samples separated by the Jeffries method (*4*). The soils sampled ranged from well drained to poorly drained. They represent Gray-Brown Podzolic soils, Red-Yellow Podzolic soils, Sols Bruns Acides, Podzols, Low-Humic Gley soils, and various intergrades of these great soil groups. Some of the soils that were sampled intergrade toward Lithosols or Planosols.

Kaolinite is the dominant clay mineral in all of the profiles sampled. Illite is abundant in the lower horizons of all of the soils except the Sol Brun Acide and the Podzol. The Sol Brun Acide and the Podzol are higher in chlorite than in illite. The Low-Humic Gley soils are low in chlorite, with the exception of the upper horizons of the Brinkerton soil. The Low-Humic Gley soils and the somewhat poorly drained soils of other great soil groups show traces or low quantities of vermiculite. The relative composition of the clay minerals is also shown in table 9.

All profiles that were sampled for laboratory characterization are described in the section "Formation, Morphology, and Classification of Soils" under the heading "Detailed Descriptions of Soil Profiles." Sample numbers corresponding to those shown in table 9 are designated for each of the profiles sampled.

The Armagh silt loams are Low-Humic Gley soils that developed on acid clay shale, called fire clay. The clay shale is generally stratified with siltstone, and in places with thin beds of sandstone. In some places coarse fragments of siltstone or sandstone persist in the weathered soil. In profile S 58–Pa–33–16, there are a great many coarse fragments in the lower part of the B horizon, which is underlain by hard, sandy shale. Some of the coarse fragments in the A2 and B horizons of both profiles are large brown or black concretions. Concretions are also present in the sand fractions. Mechanical analysis shows less silt and more clay in the surface layer than was recognized in the field, apparently because of the presence of much coarse clay and the modifying effect of the organic matter. The bulk density is high in the subsoil and in the C horizon, which indicates low porosity.

The cation-exchange capacity is moderate, and the degree of base saturation is low. The proportion of bases increases slightly in the lower horizons.

The Brinkerton silt loams are Low-Humic Gley soils that developed in acid, fine- to medium-textured colluvium. The colluvium is along the sides of valleys and around the heads of streams, where surface and internal drainage are not well established. Coarse fragments are very scarce except in the surface layer of sample S 58–Pa–33–7. Most coarse fragments are brown and reddish-brown concretions. The proportion of silt and clay made the texture in both profiles close to either silt loam or silty clay loam. The data show little evidence of clay movement, but clay coatings on the faces of peds and in the pores appear on morphological examination. The bulk density is moder-

[5] Laboratory analyses were made at the Soil Characterization Laboratory of The Pennsylvania State University under the direction of Dr. R. P. Matelski. Analyses are by C. F. Engle, E. C. Mason, and staff.

ate for both samples, but it is high in the Bm horizon of sample S 58–Pa–33–8.

These slowly permeable soils, which are on the lower slopes, are not strongly leached. They have retained lime from the ground water and also the lime that has been added by farming operations. The reaction ranges from acid to neutral, and the lower horizons show an increase in acidity. The cation-exchange capacity is moderate, as might be expected from the dominance of kaolinite among the clay minerals and the fairly high proportion of clay in the total soil mass. The degree of saturation with bases is medium.

The Cavode silt loams are somewhat poorly drained Red-Yellow Podzolic soils that are intergrading toward Gray-Brown Podzolic soils. Both samples show an abrupt increase in clay from the A horizon to the B1 horizon. These soils were developed in material weathered from clay shale interbedded with small amounts of siltstone and fine sandstone. The profiles sampled show moderate amounts of coarse fragments, which include bits of sandstone and shale as well as brown concretions. The bulk density for these soils is moderate for the subsoil, but it increases to fairly high in the lower horizons.

The available moisture capacity, which is based on the difference between the moisture retained by cores at 1/3 atmosphere tension and the moisture held at 15 atmospheres tension is moderately low. Both sites had been limed, but not recently. Both samples show fairly high reaction in the surface layer; the acidity increases with increasing depth. Both profiles show moderate cation-exchange capacity, and the highest degree of base saturation is in the limed and fertilized surface layer. The base saturation decreases downward into the B horizon, and in sample S 58–Pa–33–9 it increases slightly in the C horizon.

The Cookport very stony loams are moderately well drained Red-Yellow Podzolic soils that are intergrading toward Gray-Brown Podzolic soils. They were developed in material weathered from acid, gray and yellow sandstone and shale. They have a moderate fragipan. The samples were collected in areas mapped as a very stony phase, which is the most extensive kind of Cookport soil. Large sandstone boulders are common on the surface and in the profile, but coarse fragments smaller than boulders are scarce. The bulk density is moderately high in the horizons that were tested. It was impossible to core the fragipan for bulk density. Both profiles have a distinct increase in clay in the B horizon, which makes it a textural B horizon. The surface texture of both profiles is loamy, but sample S 58–Pa–33–1 is very close to silt loam. This profile is also high in fine and very fine sand, and sample S 58–Pa–33–3 is higher in medium and coarse sand.

These soils have a moderately high content of organic carbon in their upper horizons, and they have a moderately wide carbon-nitrogen ratio. The Cookport soils have low to moderately low cation-exchange capacity. They are strongly acid and have a low degree of base saturation.

Only one representative profile of the Dekalb series was sampled in this county. Other samples have been studied in Clinton and Carbon Counties. The representative Dekalb soil is a well-drained, moderately deep Sol Brun Acide that developed in material weathered from acid, gray and yellow sandstone. It is generally very stony and contains many hard sandstone boulders. Smaller fragments of sandstone are also common throughout the profile. The texture is dominated by medium and fine sand. The laboratory data show no sign of a textural B horizon, but some thin clay films can be seen in field examination.

Organic carbon is moderate in the A horizon, and the carbon-nitrogen ratio is wide. The upper horizons are very strongly acid, and the pH increases only slightly in the lower horizons. The cation-exchange capacity is low, and the degree of base saturation is very low, except for moderate increase in the B3 and C horizons. Kaolinite is the dominant clay mineral in this soil, as in all the other soils analyzed in the county. This soil also has relatively more chlorite than any other soil except the Leetonia.

The Ernest soils are in the Gray-Brown Podzolic great soil group but are intergrading toward Red-Yellow Podzolic soils. They developed in deep, unconsolidated deposits of silt loam or silty clay loam that contains many fragments of sandstone and shale. The parent material weathered from light-colored, acid siltstone, sandstone, and shale. Coarse fragments make up from one-sixth to one-third of the weight of the soil material in each profile. The bulk density is moderate in both profiles, and there is only a gradual increase with increasing depth. The apparent pan in the lower part of the B horizon is more dense than the soil material in the horizons above, but it is not extremely different. Concretions make up a small part of the coarse fragments and also occur in the sand fractions of the pan and in the more strongly mottled horizons. Both profiles have a well-developed textural B horizon.

The accumulation of organic carbon in the plow layer is moderate, and the carbon-nitrogen ratio is narrow. The Ernest soils are strongly acid except where they are influenced by liming, as in the upper three horizons of sample S 58–Pa–33–15. The cation-exchange capacity is moderately high for soils in this area. The degree of saturation with bases varies. Sample S 58–Pa–33–15 was evidently influenced by liming, which has brought the entire profile to approximately 50 percent saturation. Sample S 58–Pa–33–13 shows a range from 20 percent saturation of the upper horizons to 36 percent in the C1 horizon.

The Gilpin soils are well drained and are moderately deep to shallow. They are in the Gray-Brown Podzolic great soil group but are intergrading toward Red-Yellow Podzolic soils. They were developed in material weathered from acid, gray and brown siltstone interbedded with shale and fine-grained sandstone. Coarse fragments make up more than half the weight of sample S 58–Pa–33–5 and about one-third of the weight of sample S 58–Pa–33–6. The data for particle-size distribution show more sand than was recognized in the field. Field examination showed clay films and silt coatings in the lower horizons, which were detected in the analysis of sample S 58–Pa–33–5 but are not recognizable in the data for sample S 58–Pa–33–6.

Organic carbon is moderate in the plow layer of one profile and moderately high in the other. In these cultivated soils the carbon-nitrogen ratio is narrow for both profiles. Liming has raised the pH of the three upper horizons of sample S 58–Pa–33–6 far above the natural level. The cation-exchange capacity is moderately low. Heavy liming has raised the degree of saturation of the upper 27 inches of sample S 58–Pa–33–6.

TABLE 9.—*Characterization data*

[In the columns that show clay mineralogy, the amounts of minerals present are indicated as tr=trace; x=small; xx=moderate; xxx=large; data were not

Soil name, sample number, and location	Horizon	Depth	Coarse fragments (greater than 2 mm.)	Particle-size distribution: Very coarse sand (2.0 to 1.0 mm.)	Coarse sand (1.0 to 0.5 mm.)	Medium sand (0.5 to 0.25 mm.)	Fine sand (0.25 to 0.10 mm.)	Very fine sand (0.10 to 0.05 mm.)	Silt (0.05 to 0.002 mm.)	Clay (less than 0.002 mm.)	Textural class	Bulk density	Moisture held at—: Tension of 1/3 atmosphere (cores)	Tension of 15 atmospheres (fragments)
		Inches	*Percent by weight*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*			*Percent*	*Percent*
Armagh silt loam:	Ap	0–6	7. 4	0. 4	1. 1	2. 2	3. 5	5. 5	57. 5	29. 8	Silty clay loam.	1. 15	33. 3	15. 5
S 58–Pa–33–12–(1–7)	B1g	6–11	13. 8	. 3	. 8	. 5	1. 0	6. 0	51. 3	40. 1	Silty clay	1. 36	26. 9	16. 6
(2 miles S. of Brookville, S. of Port Barnett-Knox Dale Road, Knox Township)	B21g	11–15	22. 5	2. 4	2. 4	1. 4	1. 9	7. 9	45. 8	38. 2	Silty clay loam.	1. 29	31. 3	17. 2
	B22g	15–23	21. 8	5. 0	6. 9	4. 1	3. 2	9. 3	44. 2	27. 3	Clay loam	1. 41	26. 1	13. 1
	B31g	23–30	21. 2	1. 8	2. 6	2. 4	2. 2	6. 1	52. 4	32. 5	Silty clay loam.	1. 62	18. 9	13. 1
	B32g	30–38	12. 7	1. 1	1. 4	1. 1	1. 4	4. 5	52. 7	37. 8	Silty clay loam.	1. 70	18. 2	13. 3
	Cg	38–48	15. 1	1. 1	1. 6	1. 4	1. 2	3. 7	59. 4	31. 6	Silty clay loam.	1. 82	15. 5	11. 6
Armagh silt loam:	Ap	0–8	9. 2	3. 3	4. 8	4. 1	5. 8	7. 5	37. 5	37. 0	Clay loam.	------	------	20. 9
S 58–Pa–33–16–(1–7)	A2g	8–10	14. 1	3. 4	5. 2	5. 0	6. 0	8. 2	38. 0	34. 2	Clay loam.	------	------	18. 8
(3 miles S. of Reynoldsville, and 2 miles W. of Sykesville along a blacktop road in Winslow Township)	B1g	10–15	15. 7	1. 2	3. 7	2. 8	5. 5	10. 1	41. 1	35. 6	Clay loam.	------	------	17. 4
	B21g	15–24	20. 6	. 8	2. 9	2. 8	6. 4	12. 3	38. 6	36. 2	Clay loam.	------	------	16. 5
	B22g	24–29	20. 6	3. 4	3. 5	2. 1	6. 4	13. 7	40. 4	30. 5	Clay loam.	------	------	12. 6
	B3g	29–41	45. 6	6. 1	6. 4	3. 4	6. 6	12. 6	46. 3	18. 6	Loam	------	------	9. 6
	D1	41–46	67. 9	11. 7	12. 7	7. 0	5. 6	6. 2	33. 5	23. 3	Loam	------	------	13. 9
Brinkerton silt loam:	Ap	0–7	35. 5	. 4	. 9	2. 1	3. 6	4. 4	56. 9	31. 7	Silty clay loam.	1. 21	36. 8	15. 6
S 58–Pa–33–7–(1–6)	B1g	7–11	. 3	. 3	. 6	. 7	1. 4	2. 9	62. 5	31. 6	Silty clay loam.	1. 37	28. 2	15. 9
(0.6 mile W. of Knox Dale to dirt road, 0.7 mile N. in Knox Township)	B21g	11–19	5. 8	2. 0	3. 0	2. 3	2. 4	3. 5	55. 3	31. 5	Silty clay loam.	1. 38	29. 3	14. 6
	B22m	19–24	2. 2	4. 1	4. 2	2. 9	2. 8	3. 7	53. 4	28. 9	Silty clay loam.	1. 49	25. 0	13. 5
	B3	24–34	3. 9	1. 5	2. 5	2. 7	10. 3	1. 8	52. 4	28. 8	Silty clay loam.	1. 67	19. 9	12. 6
	C1	34–48	5. 6	1. 4	1. 5	1. 9	2. 5	4. 3	56. 2	32. 2	Silty clay loam.	------	------	12. 5
Brinkerton silt loam:	Ap	0–6	. 6	1. 0	4. 9	4. 3	4. 4	8. 8	51. 1	25. 5	Silt loam	1. 13	40. 5	14. 3
S 58–Pa–33–8–(1–6)	B1g	6–11	1. 7	1. 7	5. 6	2. 9	2. 6	7. 6	54. 3	25. 3	Silt loam	1. 38	30. 3	13. 2
(0.5 mile W. of Sugar Hill in Warsaw Township)	B21g	11–16	1. 7	1. 0	3. 5	2. 5	2. 0	4. 0	58. 5	28. 5	Silty clay loam.	1. 33	31. 8	13. 7
	B22g	16–26	1. 5	. 8	1. 6	1. 1	1. 6	4. 9	61. 6	28. 4	Silty clay loam.	1. 42	29. 0	12. 4
	B3g	26–33	2. 0	5. 6	5. 8	3. 4	3. 7	7. 0	50. 0	24. 5	Silt loam	1. 58	23. 8	12. 6
	Bm	33–51	14. 2	5. 5	6. 7	4. 0	4. 9	8. 7	45. 3	24. 9	Loam	1. 80	13. 5	10. 1

for some Jefferson County soils

and xxxx=predominant. Blank spaces indicate no trace. Absence of data in other columns indicates that tests were not made or that applicable]

Organic carbon	Nitrogen	Carbon-nitrogen ratio	Field reaction	Extractable cations (milliequivalents per 100 grams of soil)					Cation-exchange capacity		Base saturation		Calcium magnesium ratio	Clay mineralogy			
				Ca	Mg	Na	K	H	Sum	NH_4AC	Sum	NH_4AC		Kaolinite	Illite	Chlorite	Vermiculite
Percent	*Percent*		*pH*						*Meq./100 g. of soil*	*Meq./100 g. of soil*	*Percent*	*Percent*					
2.09	0.158	13.2	5.0	3.5	0.6	0.3	0.3	20.6	25.3	28.7	19	16	5.8	xxxx	xx	x	tr
.43	.064	6.7	4.5	2.5	.5	.3	.3	13.6	17.2	14.1	21	26	5.0	xxxx	xxx	tr	tr
.45	.066	6.8	4.7	1.8	.7	.3	.3	17.0	20.1	15.3	15	20	2.6	xxxx	xxx	tr	tr
.35	.051	6.9	5.0	1.0	1.0	.2	.2	13.1	15.5	14.9	15	16	1.0	xxxx	xxx	tr	tr
.16	.048	3.3	4.9	.4	1.7	.2	.2	16.6	19.1	12.9	13	19	.2	xxxx	xx	tr	tr
.23	.050	4.6	4.7	.4	2.4	.4	.2	12.0	15.4	12.1	23	30	.2	xxxx	xxx	tr	tr
.10	.048	2.1	4.8	.4	2.6	.3	.2	9.2	12.7	10.9	28	32	.1	xxxx	xxx	tr	tr
2.37	.216	11.0	4.9	3.6	1.5	.4	.3	32.0	37.8	30.8	15	19	2.4	xxxx	xx	x	tr
1.34	.148	9.1	5.4	3.8	1.3	.4	.3	24.7	30.5	31.4	19	18	2.9	xxxx	xx	x	x
.44	.060	7.3	5.3	3.6	1.1	.4	.2	18.9	24.2	21.9	21	23	3.3	xxxx	xx	tr	x
.36	.050	7.2	5.3	4.2	1.3	.4	.2	17.7	23.8	20.3	26	30	3.2	xxxx	xxx	tr	x
.20	.044	4.5	5.3	3.4	1.4	.4	.2	14.7	20.1	19.9	27	27	2.4	xxxx	xx	tr	x
.12	.044	2.7	5.4	3.6	1.9	.4	.2	12.9	19.0	17.8	32	34	1.9	xxxx	xx	tr	x
.24	.053	4.5	5.4	6.5	2.4	.5	.3	14.7	24.4	24.6	40	39	2.7	xxxx	xxx	tr	x
2.74	.214	12.8	5.5	5.1	1.3	.5	.4	17.7	25.0	18.2	29	40	3.9	xxx	xx	xx	
.66	.065	10.1	5.4	3.5	.9	.4	.3	15.8	20.9	16.7	24	30	3.9	xxxx	xx	xx	tr
.57	.054	10.5	5.5	2.7	.9	.4	.3	12.9	17.2	16.1	25	27	3.0	xxxx	xx	x	tr
.54	.050	10.8	5.7	2.6	1.1	.4	.3	14.5	18.9	14.7	23	30	2.4	xxxx	xx	tr	tr
.53	.042	12.6	6.0	4.4	3.5	.6	.3	5.9	14.7	13.3	60	66	1.2	xxxx	xxx	tr	tr
.63	.047	13.4	7.0	1.4	5.5	.6	.3	5.1	12.9	13.5	60	58	.2	xxxx	xxx	tr	tr
3.18	.205	15.5	5.9	3.9	1.0	.5	.2	19.4	25.0	20.2	22	28	3.9	xxxx	xx	xx	
1.07	.083	12.9	5.6	2.4	1.1	.4	.2	12.3	16.4	15.0	25	27	2.2	xxx	xx	x	tr
.67	.074	9.0	5.6	2.5	1.7	.4	.1	12.9	17.6	16.2	27	29	1.5	xxxx	xx	x	tr
.56	.065	8.6	5.7	2.8	2.3	.5	.2	10.7	16.5	16.2	35	36	1.2	xxx	xx	tr	tr
.50	.050	10.0	5.8	4.4	3.6	.5	.2	9.5	18.2	16.0	48	54	1.2	xxxx	xx	tr	tr
.56	.051	11.0	5.8	3.4	3.0	.4	.2	9.1	16.1	13.9	43	50	1.1	xxxx	xxx	tr	tr

TABLE 9.—*Characterization data for some*

Soil name, sample number, and location	Horizon	Depth	Coarse fragments (greater than 2 mm.)	Particle-size distribution: Very coarse sand (2.0 to 1.0 mm.)	Coarse sand (1.0 to 0.5 mm.)	Medium sand (0.5 to 0.25 mm.)	Fine sand (0.25 to 0.10 mm.)	Very fine sand (0.10 to 0.05 mm.)	Silt (0.05 to 0.002 mm.)	Clay (less than 0.002 mm.)	Textural class	Bulk density	Moisture held at— Tension of 1/3 atmosphere (cores)	Moisture held at— Tension of 15 atmospheres (fragments)
		Inches	*Percent by weight*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*			*Percent*	*Percent*
Cavode silt loam: S 58-Pa-33-9-(1-8) (0.5 mile SW. of Brookville in Rose Township)	Ap	0–9	21.0	4.0	3.9	2.8	3.4	6.8	51.4	27.7	Clay loam to loam or silt loam.	1.29	27.5	15.7
	B1	9–12	13.9	.9	1.0	.7	1.2	5.3	49.3	41.6	Silty clay.	1.50	25.8	15.4
	B21g	12–15	13.3	1.3	1.5	1.0	1.4	4.8	58.0	32.0	Silty clay loam.	1.50	25.0	14.5
	B22g	15–21	14.8	1.7	2.7	1.8	1.8	4.1	55.7	32.2	Silty clay loam.	1.53	22.8	13.6
	B23g	21–31	21.9	2.5	2.7	1.8	1.8	3.4	58.3	29.5	Silty clay loam.	1.67	20.9	12.5
	B31g	31–39	15.6	2.0	1.7	1.2	1.2	3.0	57.8	33.1	Silty clay loam.	1.67	21.3	14.1
	B32	39–42	14.2	1.9	3.0	1.8	1.3	2.9	62.1	27.0	Silt loam	1.70	22.1	11.9
	C	42–54	20.1	5.7	5.3	2.5	1.6	4.7	59.7	20.5	Silt loam	1.68	19.1	9.4
Cavode silt loam: S 58-Pa-33-10-(1-7) (1.5 miles NW. of Brookville, along a blacktop road in Rose Township)	Ap	0–8	17.3	2.3	2.5	2.9	5.8	4.7	56.9	24.9	Silt loam	1.23	29.2	13.7
	B1	8–14	9.6	1.6	1.8	2.0	4.4	3.7	57.2	29.3	Silty clay loam.	1.44	24.6	14.1
	B21	14–17	14.6	1.0	1.8	1.9	4.2	3.3	54.4	33.4	Silty clay loam.	1.43	26.4	15.2
	B22g	17–25	18.6	.9	1.2	1.2	2.4	2.4	58.0	33.9	Silty clay loam.	1.54	23.8	14.7
	B23g	25–33	19.5	3.9	4.8	3.5	6.1	4.2	52.5	25.0	Silt loam	1.49	23.0	11.1
	B24g	33–37	22.6	4.4	5.3	3.9	5.6	4.8	53.6	22.4	Silt loam	1.56	21.3	10.3
	B3	37–45	19.0	5.8	6.5	4.6	7.2	5.5	49.4	21.0	Loam	1.71	16.3	9.3
Cookport very stony loam: S 58-Pa-33-1-(9) (0.9 mile W. of Ross Leffler School of Conservation along a dirt road, Snyder Township)	A00	2–1	------	------	------	------	------	------	------	------	------	------	------	------
	A0	1–0	9.8	------	------	------	------	------	------	------	------	------	------	------
	A21	0–4	8.4	1.2	1.8	4.3	17.6	11.0	48.3	15.8	Loam	1.26	26.7	8.4
	A22	4–11	8.1	1.0	1.9	4.7	17.4	11.5	46.9	16.6	Loam	1.47	20.0	7.9
	B1	11–16	13.4	1.7	2.0	4.0	17.4	12.3	41.8	20.8	Loam	1.63	18.0	8.5
	B21	16–22	6.4	1.0	1.6	3.6	18.4	13.9	34.2	27.3	Clay loam.	1.71	17.8	10.7
	B22	22–27	9.2	.5	.9	2.8	17.3	15.1	32.9	30.5	Clay loam.	1.70	17.6	11.0
	B23	27–34	3.2	.7	.8	2.8	16.7	15.2	32.9	30.9	Clay loam.	1.70	16.9	11.5
	B24m	34–41	4.5	.4	.7	2.7	19.0	15.9	29.7	31.6	Clay loam.	------	------	11.1
	C1	41–47	15.3	2.6	2.8	3.8	21.8	15.1	27.7	26.2	Sandy clay loam.	------	------	10.4
Cookport very stony loam: S 58-Pa-33-3(-9) (0.3 mile W. of Hays Lot Fire Tower on a dirt road, Heath Township)	A00	3–2	------	------	------	------	------	------	------	------	------	------	------	------
	A0	2–0	12.2	------	------	------	------	------	------	------	------	------	------	23.4
	A2	0–5	1.2	.9	9.6	22.7	6.5	2.9	44.6	12.9	Loam	1.25	27.0	6.5
	B1	5–11	2.1	.9	9.4	22.0	6.6	3.0	45.4	12.7	Loam	1.32	21.7	9.0
	B21	11–16	2.7	1.2	10.6	25.7	7.2	3.2	31.9	20.2	Loam	1.64	18.0	9.0
	B22	16–21	1.7	1.7	11.9	25.8	8.5	4.3	30.8	17.0	Sandy loam.	1.59	18.2	7.8
	B23m	21–25	7.5	1.7	10.4	21.9	8.9	6.1	29.3	21.7	Loam	------	------	9.6
	B24m	25–34	7.4	3.3	9.9	17.4	8.5	6.2	30.3	24.4	Loam	------	------	10.0
	B25m	34–41	5.5	3.4	10.0	15.2	7.2	5.9	33.2	25.1	Loam	------	------	10.1
	C1	41–46	4.8	2.7	12.5	20.4	7.8	5.0	29.7	21.9	Loam	------	------	9.4

Jefferson County soils—Continued

Organic carbon	Nitrogen	Carbon-nitrogen ratio	Field reaction	Extractable cations (milliequivalents per 100 grams of soil)					Cation-exchange capacity		Base saturation		Calcium magnesium ratio	Clay mineralogy			
				Ca	Mg	Na	K	H	Sum	NH_4AC	Sum	NH_4AC		Kaolinite	Illite	Chlorite	Vermiculite
Percent	*Percent*		*pH*						*Meq./100 g. of soil*	*Meq./100 g. of soil*	*Percent*	*Percent*					
2.58	0.191	13.5	7.7	12.2	0.5	0.6	0.3	7.0	20.6	20.5	66	66	24.4	xxxx	xx	x	tr
.90	.054	16.7	5.7	3.1	.3	.2	.2	12.5	16.3	22.2	23	17	10.3	xxxx	xxx	tr	tr
.57	.048	11.9	5.4	2.2	.4	.3	.1	12.3	15.3	16.5	20	18	5.5	xxxx	xxx	tr	tr
.23	.046	5.0	5.3	1.6	.5	.3	<.1	11.1	13.5	14.8	18	16	3.2	xxxx	xxx	tr	tr
.43	.048	9.0	4.9	.7	1.1	.2	<.1	11.5	13.5	17.8	15	11	.6	xxxx	xxx	tr	tr
.47	.049	9.6	5.1	.7	2.2	.2	.1	19.2	22.4	23.5	14	14	.3	xxxx	xxx	tr	tr
.39	.046	8.5	5.3	.9	2.7	.2	.1	15.1	21.0	------	20	------	.3	xxxx	xx	tr	tr
.19	.044	4.3	5.3	.9	2.4	.2	.1	13.0	16.6	18.1	22	20	.4	xxxx	xx	tr	tr
2.44	.217	11.2	6.7	11.1	.8	.8	1.3	4.2	18.2	20.3	77	69	13.9	xxxx	xx	x	tr
.49	.070	7.0	6.6	7.9	.8	.7	.3	6.1	15.8	21.2	61	46	9.9	xxxx	xx	x	tr
.41	.061	6.7	6.3	7.9	.9	.5	.3	8.5	18.1	18.8	53	51	8.8	xxxx	xx	x	x
.24	.046	5.2	5.3	5.4	.7	.3	.2	9.2	15.8	22.6	42	29	7.7	xxxx	xx	x	x
.21	.040	5.3	4.9	3.3	.8	.3	.2	8.8	13.4	17.2	34	27	4.1	xxxx	xx	tr	tr
.16	.037	4.3	4.9	2.4	1.1	.2	.1	11.3	15.1	17.0	25	22	2.2	xxxx	xxx	tr	tr
.24	.032	7.5	5.1	1.8	1.2	.1	.1	10.4	13.6	17.4	24	18	1.5	xxxx	xx	tr	tr
13.36	.580	23.0	4.8	4.6	1.8	.3	.3	31.2	38.2	33.9	18	21	2.6	xx	x	tr	tr
1.04	.123	8.5	5.0	.4	.1	.2	.2	16.6	17.5	16.0	5	6	4.0	xxx	x	tr	tr
1.24	.077	16.1	5.2	.2	.2	.2	.1	13.4	14.1	11.8	5	6	1.0	xxx	x	x	tr
.40	.046	8.7	5.2	.2	.2	.2	.1	7.3	8.0	9.2	9	8	1.0	xxxx	xx	x	x
.20	.032	6.2	5.2	.4	<.1	.2	.1	9.5	10.2	9.8	7	7	4.0	xxxx	xx	tr	tr
.16	.041	3.9	5.2	.4	.1	.2	.1	10.7	11.5	12.2	7	7	4.0	xxxx	xxx	tr	tr
.14	.034	4.1	5.3	.4	.2	.2	.1	10.2	11.1	11.5	8	8	2.0	xxxx	xxx	tr	x
.12	.031	3.9	5.3	.3	.3	.1	.1	9.8	10.6	11.0	7	7	1.0	xxxx	xxx	tr	x
.14	.038	3.7	5.4	.3	.3	.1	.1	8.8	9.6	11.2	8	7	1.0	xxxx	xxx	tr	x
10.00	.640	15.6	4.6	3.2	1.9	.1	.2	30.2	35.6	30.4	15	18	1.7	xxx	x	xx	tr
1.43	.107	13.4	5.1	.2	.2	.1	.2	11.0	11.7	8.8	6	8	1.0	xxxx	x	xx	
.79	.065	12.1	5.3	.3	.1	.2	.1	12.5	13.2	10.7	5	6	3.0	xxxx	x	xx	
.26	.052	5.0	5.3	.5	.3	.2	.1	9.4	10.5	11.6	10	9	1.7	xxxx	xx	xx	tr
.14	.037	3.8	5.4	.5	.3	.2	.1	7.0	8.1	8.8	13	12	1.7	xxxx	xx	x	x
.12	.039	3.1	5.3	.4	.3	.1	.2	7.3	8.3	8.1	12	12	1.3	xxxx	xxx	x	x
.10	.037	2.7	5.2	.8	.4	.1	.1	7.2	8.6	8.0	16	17	2.0	xxxx	xxx	tr	tr
.08	.037	2.2	5.1	.4	.6	.1	.1	7.1	8.3	7.9	14	15	.7	xxxx	xxxx	tr	tr
.08	.054	1.5	5.2	.3	.6	.4	.2	6.3	7.8	7.9	19	19	.5	xxxx	xxx	tr	tr

TABLE 9.—*Characterization data for some*

Soil name, sample number, and location	Horizon	Depth	Coarse fragments (greater than 2 mm.)	Particle-size distribution: Very coarse sand (2.0 to 1.0 mm.)	Coarse sand (1.0 to 0.5 mm.)	Medium sand (0.5 to 0.25 mm.)	Fine sand (0.25 to 0.10 mm.)	Very fine sand (0.10 to 0.05 mm.)	Silt (0.05 to 0.002 mm.)	Clay (less than 0.002 mm.)	Textural class	Bulk density	Moisture held at—: Tension of ci atmosphere (cores)	Tension of 15 atmospheres (fragments)
		Inches	*Percent by weight*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*			*Percent*	*Percent*
Dekalb very stony loam:	A00	1½–1	------	------	------	------	------	------	------	------	------	------	------	------
S 58–Pa–33–2–(1–7)	A0	1–0	15. 7	------	------	------	------	------	------	------	------	------	------	16. 2
(In Heath Township,	A1	0–6	14. 4	3. 1	6. 8	17. 2	17. 3	6. 0	38. 5	11. 1	Loam	------	------	7. 0
2.5 miles W. of	A3	6–9	19. 1	3. 3	6. 6	15. 6	17. 2	5. 7	38. 5	13. 1	Loam	------	------	6. 4
Green Briar, N.	B21	9–18	24. 4	4. 6	7. 5	17. 5	15. 4	4. 8	37. 7	12. 5	Loam	------	------	5. 8
along a dirt road	B22	18–24	22. 4	4. 5	7. 9	26. 5	5. 4	5. 0	37. 1	13. 6	Loam	------	------	5. 9
to Hallton)	B3	24–31	26. 0	4. 6	8. 1	18. 2	14. 4	4. 6	37. 6	12. 5	Loam	------	------	5. 4
	C1	31–34	28. 9	5. 4	7. 8	15. 7	17. 6	6. 7	36. 3	10. 5	Fine sandy loam.	------	------	4. 5
Ernest silt loam:	Ap	0–8	16. 4	1. 0	1. 6	1. 5	4. 7	4. 9	67. 6	18. 7	Silt loam	1. 09	31. 7	9. 4
S 58–Pa–33–13–(1–7)	A2	8–11	20. 3	1. 3	1. 5	1. 4	4. 2	4. 4	69. 3	17. 9	Silt loam	1. 33	23. 8	9. 4
(4 miles S. of Brookville along Hunters	B1	11–15	25. 7	. 9	1. 3	1. 3	4. 2	4. 6	63. 8	23. 9	Silt loam	1. 32	24. 8	10. 0
Chapel Road in	B21	15–20	30. 9	. 9	1. 4	1. 3	4. 2	4. 7	70. 6	16. 9	Silt loam	1. 41	23. 7	10. 6
Knox Township)	B22g	20–31	27. 1	1. 5	1. 8	1. 7	4. 0	4. 5	60. 7	25. 8	Silt loam	1. 46	21. 8	11. 2
	B23g	31–42	31. 8	2. 3	2. 6	2. 3	4. 4	4. 4	58. 9	25. 1	Silt loam	1. 62	17. 4	9. 6
	C1	42–50	37. 8	3. 5	4. 3	3. 1	3. 5	4. 8	58. 1	22. 7	Silt loam	------	------	9. 7
Ernest silt loam:	Ap1	0–5	30. 4	7. 6	8. 0	5. 2	8. 2	8. 0	41. 2	21. 8	Loam	1. 32	23. 1	11. 1
S 58–Pa–33–15–(1–9)	Ap2	5–11	17. 4	2. 1	2. 9	3. 3	6. 3	7. 1	50. 9	27. 4	Clay loam.	1. 32	20. 8	11. 8
(5 miles S. of Brookville in a pasture	B1	11–17	21. 4	. 3	. 8	1. 0	2. 7	4. 2	47. 0	44. 0	Silty clay	1. 26	27. 9	18. 9
along State Route 36 in Rose Township)	B21	17–24	16. 1	. 2	1. 1	1. 3	2. 2	2. 7	52. 6	39. 9	Silty clay loam.	1. 37	31. 0	18. 1
	B22g	24–28	15. 4	. 6	1. 4	1. 4	1. 8	2. 6	59. 2	33. 0	Silty clay loam.	1. 44	23. 6	13. 9
	B23g	28–37	21. 2	. 5	. 5	. 5	1. 0	2. 0	61. 7	33. 8	Silt clay loam.	1. 41	26. 4	12. 6
	B24m	37–40	26. 9	2. 3	2. 6	1. 9	2. 6	3. 8	57. 9	28. 9	Silty clay loam.	1. 55	20. 6	12. 1
	B3g	40–48	22. 6	. 4	. 6	. 7	1. 2	2. 4	62. 0	32. 7	Silty clay loam.	1. 52	22. 4	14. 3
	C1	48–56+	25. 9	. 4	. 6	. 5	. 9	1. 9	62. 8	32. 9	Silty clay loam.	1. 59	22. 3	12. 7
Gilpin channery silt loam:	Ap	0–8	52. 9	16. 4	10. 0	5. 3	7. 8	10. 6	39. 0	10. 9	Loam	------	------	6. 8
S 58–Pa–33–5–(1–4)	B2	8–14	72. 3	12. 9	8. 2	3. 8	6. 1	7. 7	48. 7	12. 6	Loam	------	------	6. 8
(1.6 miles S. of Ohl	B3	14–18	79. 3	18. 0	9. 7	4. 0	5. 5	6. 4	42. 3	14. 1	Loam	------	------	7. 1
in Beaver Township)	C1	18–22	79. 0	14. 9	9. 5	4. 5	5. 2	7. 0	44. 2	14. 7	Loam	------	------	7. 0
Gilpin channery silt loam:	Ap	0–7	33. 7	7. 4	4. 2	3. 8	8. 5	6. 4	52. 7	17. 0	Silt loam	------	------	9. 8
S 58–Pa–33–6–(1–5)	B1	7–13	44. 0	9. 0	7. 6	5. 1	6. 8	6. 1	48. 8	16. 6	Loam	------	------	7. 8
(0.5 mile E. of Oliveburg along a dirt	B2	13–19	35. 4	8. 9	8. 3	4. 9	6. 1	5. 8	51. 1	14. 9	Silt loam	------	------	7. 4
road in Oliver	B3	19–27	29. 0	12. 6	11. 6	5. 6	5. 4	5. 1	45. 3	14. 4	Loam	------	------	7. 0
Township)	C1	27–40	37. 8	14. 0	10. 3	6. 2	8. 0	8. 7	46. 8	6. 0	Sandy loam.	------	------	5. 9
Leetonia very stony sandy loam:	A0	2–0	15. 1	------	------	------	------	------	------	------	------	------	------	30. 1
S 58–Pa–33–11–(1–6)	A2	0–4	80. 1	2. 7	7. 0	37. 7	14. 8	3. 8	26. 5	7. 5	Sandy loam.	------	------	5. 9
(1.2 miles SW. of Clear Creek State	B1	4–8	75. 9	5. 5	7. 7	28. 8	13. 6	3. 4	31. 2	9. 8	Sandy loam.	------	------	6. 9
Park along the road to Beartown Rocks,	B2	8–15	76. 8	4. 3	9. 6	36. 9	14. 8	3. 7	23. 0	7. 7	Sandy loam.	------	------	4. 4
Heath Township)	C1	15–26	75. 2	4. 7	9. 8	37. 1	15. 9	3. 6	24. 1	4. 8	Sandy loam.	------	------	2. 9
	C2	26–36	75. 0	4. 3	9. 2	39. 2	17. 3	4. 5	20. 6	4. 9	Sandy loam.	------	------	2. 5

Jefferson County soils—Continued

Organic carbon	Nitrogen	Carbon-nitrogen ratio	Field reaction	Extractable cations (milliequivalents per 100 grams of soil): Ca	Mg	Na	K	H	Cation-exchange capacity: Sum	NH₄AC	Base saturation: Sum	NH₄AC	Calcium magnesium ratio	Clay mineralogy: Kaolinite	Illite	Chlorite	Vermiculite
Percent	*Percent*		*pH*						*Meq./100 g. of soil*	*Meq./100 g. of soil*	*Percent*	*Percent*					
8. 44	. 352	24. 0	4. 0	1. 8	0. 7	0. 3	0. 2	26. 4	29. 4	26. 3	10	11	2. 6	xxxx	x	xxx	x
1. 47	. 100	14. 7	4. 6	. 1	. 2	. 4	. 2	10. 0	10. 9	10. 2	8	9	. 5	xxxx	x	xx	
1. 05	. 078	13. 5	4. 9	. 1	. 2	. 4	. 2	8. 6	9. 5	9. 1	9	10	. 5	xxxx	x	xxx	
. 56	. 051	11. 0	5. 0	<. 1	. 1	. 4	. 2	7. 3	8. 0	8. 3	9	8	1. 0	xxxx	x	xx	
. 32	. 036	8. 9	5. 0	<. 1	. 1	. 4	. 2	6. 9	7. 6	7. 8	9	9	1. 0	xxxx	x	xxx	
. 20	. 032	6. 2	5. 2	. 2	. 3	. 4	. 2	6. 2	7. 3	8. 1	15	14	. 7	xxxx	x	xx	
. 36	. 038	9. 5	5. 2	. 1	. 2	. 5	. 2	5. 5	6. 5	5. 3	15	19	. 5	xxxx	xx	xx	
1. 79	. 144	12. 4	5. 1	2. 3	. 4	. 3	. 3	15. 9	19. 2	16. 6	17	20	5. 8	xxxx	xx	xx	
. 48	. 056	8. 6	5. 4	2. 6	. 4	. 4	. 2	13. 0	16. 6	15. 9	22	23	6. 5	xxxx	xx	x	tr
. 32	. 042	7. 6	5. 3	2. 5	. 4	. 3	. 2	13. 7	17. 1	15. 3	20	22	6. 2	xxxx	xx	x	tr
. 28	. 044	6. 4	5. 2	2. 5	. 7	. 3	. 2	15. 9	19. 6	18. 4	19	20	3. 6	xxxx	xx	x	x
. 20	. 037	5. 4	5. 2	2. 5	1. 4	. 3	. 2	15. 8	20. 2	20. 7	22	21	1. 8	xxxx	xx	x	x
. 14	. 026	5. 4	5. 3	1. 9	3. 6	. 3	. 2	14. 8	20. 8	18. 6	29	32	. 5	xxxx	xxx	x	x
. 12	. 033	3. 6	5. 2	2. 4	3. 5	. 4	. 2	10. 0	16. 5	17. 9	39	36	. 7	xxxx	xxx	tr	x
2. 48	. 210	11. 8	6. 9	9. 5	2. 0	. 8	. 3	10. 1	22. 7	25. 6	55	49	4. 8	xxxx	xx	tr	
1. 50	. 123	12. 2	6. 1	7. 7	. 9	. 7	. 2	11. 1	20. 6	18. 3	46	52	8. 6	xxxx	xx	x	
. 78	. 070	11. 1	5. 7	7. 0	. 8	. 7	. 2	20. 3	29. 0	21. 9	30	40	8. 8	xxxx	xx	tr	x
. 46	. 055	8. 4	5. 5	5. 1	1. 3	. 6	. 2	18. 4	25. 6	20. 2	28	36	3. 9	xxxx	xx	tr	tr
. 34	. 043	7. 9	5. 5	5. 2	2. 5	. 5	. 2	13. 0	21. 4	19. 6	39	43	2. 1	xxxx	xx	tr	tr
. 20	. 038	5. 3	5. 2	5. 1	3. 6	. 5	. 2	10. 5	19. 9	18. 4	47	51	1. 4	xxxx	xxx	tr	x
. 30	. 039	7. 7	5. 1	3. 6	3. 2	. 4	. 2	13. 1	20. 5	19. 5	36	38	1. 1	xxxx	xxx	tr	tr
. 28	. 038	7. 4	5. 2	4. 2	4. 1	. 4	. 2	11. 9	20. 8	19. 3	43	46	1. 0	xxxx	xxx	tr	tr
. 26	. 041	6. 3	5. 1	4. 8	4. 2	. 5	. 2	10. 0	19. 7	20. 2	49	48	1. 1	xxxx	xx	tr	tr
1. 67	. 186	8. 9	5. 7	3. 2	. 3	. 4	. 3	8. 2	12. 4	10. 1	34	42	10. 7	xxx	x	xx	
. 53	. 074	7. 2	5. 4	2. 8	. 5	. 4	. 3	6. 6	10. 6	9. 8	38	41	5. 6	xxxx	xx	xx	
. 46	. 064	7. 2	5. 3	2. 3	. 2	. 2	. 2	5. 8	8. 7	9. 6	33	30	11. 5	xxx	xx	x	
. 57	. 074	7. 7	5. 3	2. 3	. 3	. 3	. 2	9. 6	12. 7	9. 9	24	31	7. 7	xx	xx	xx	
2. 46	. 217	11. 3	7. 2	10. 8	. 1	. 9	. 3	4. 9	17. 0	12. 5	71	97	108. 0	xxxx	x	xx	
. 67	. 057	11. 7	6. 8	5. 2	. 4	. 6	. 3	3. 7	10. 2	9. 2	64	71	13. 0	xxx	xx	x	
. 57	. 046	12. 4	6. 6	5. 1	. 1	. 5	. 2	3. 1	9. 0	8. 6	65	69	51. 0	xxx	xx	x	
. 75	. 043	17. 4	5. 2	2. 5	. 1	. 4	. 2	6. 9	10. 1	9. 7	32	33	25. 0	xxxx	xxx	x	
. 61	. 042	14. 5	5. 2	1. 5	. 1	. 3	. 2	6. 8	8. 9	8. 5	24	25	15. 0	xxxx	xx	x	
11. 92	. 805	14. 8	4. 5	4. 1	3. 9	. 2	. 4	33. 8	42. 4	34. 3	20	25	1. 1	------	------	------	
1. 30	. 119	10. 9	4. 6	. 4	. 5	. 2	. 3	10. 1	11. 5	11. 4	12	12	. 8	xxxx	x	xxx	
1. 40	. 114	12. 3	4. 8	. 2	. 4	. 1	. 2	13. 2	14. 1	14. 5	6	6	. 5	xxxx	tr	xxxx	
. 96	. 077	12. 5	5. 1	. 4	. 3	. 1	. 2	7. 7	8. 7	8. 3	11	12	1. 3	xxxx	x	xxx	
. 59	. 055	10. 7	4. 9	. 5	. 2	. 1	. 2	5. 3	6. 3	7. 9	16	13	2. 5	xxxx	x	xx	
. 31	. 037	8. 4	5. 2	. 7	. 3	. 1	. 1	4. 9	6. 1	6. 9	20	17	2. 3	xxxx	xx	xx	

TABLE 9.—*Characterization data for some*

Soil name, sample number, and location	Horizon	Depth	Coarse fragments (greater than 2 mm.)	Particle-size distribution: Very coarse sand (2.0 to 1.0 mm.)	Coarse sand (1.0 to 0.5 mm.)	Medium sand (0.5 to 0.25 mm.)	Fine sand (0.25 to 0.10 mm.)	Very fine sand (0.10 to 0.05 mm.)	Silt (0.05 to 0.002 mm.)	Clay (less than 0.002 mm.)	Textural class	Bulk density	Moisture held at—: Tension of ⅓ atmosphere (cores)	Tension of 15 atmospheres (fragments)
		Inches	*Percent by weight*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*			*Percent*	*Percent*
Montevallo shaly silt loam: S 58–Pa–33–4–(1–4) (4 miles S. of Brookville to a blacktop road, 0.9 mile W. in Rose Township)	Ap	0–6	28. 8	7. 0	6. 4	3. 0	1. 5	1. 0	53. 5	27. 6	Silty clay loam.	1. 28	23. 9	11. 0
	B3	6–8	37. 7	6. 6	6. 2	2. 5	1. 1	. 6	46. 9	36. 1	Silty clay loam.	1. 37	22. 4	13. 8
	C1	8–12	43. 7	3. 9	4. 7	2. 7	1. 4	. 7	48. 2	38. 4	Silty clay loam.	1. 55	22. 3	14. 9
	C2	12–19	73. 2	5. 4	6. 5	3. 7	1. 9	. 9	46. 4	35. 2	Silty clay loam.	------	------	13. 5
Montevallo shaly silt loam: S 58–Pa–33–14–(1–3) (1 mile S. of Stanton, 0.7 mile E. along dirt road in Oliver Township)	Ap	0–8	62. 9	8. 3	6. 9	4. 0	5. 6	9. 6	51. 2	14. 4	Silt loam.	------	------	13. 2
	B3	8–12	89. 4	11. 8	12. 4	5. 6	3. 0	3. 8	48. 6	14. 8	Loam	------	------	6. 5
	C1	12–21	94. 7	16. 1	14. 2	6. 6	3. 7	3. 0	39. 1	17. 3	Loam	------	------	6. 5

The Leetonia soils are well-drained Podzols that developed on siliceous sandstone. They are not extensive in this county. Only one profile has been characterized. The profile sampled is not considered typical for the entire series, but it is representative of the Leetonia very stony sandy loams in Jefferson County. Even after the boulders are excluded, the samples are about three-fourths coarse fragments. The texture of all of the horizons is sandy loam. There is not enough of an increase in clay in the B horizon to qualify it as a textural B horizon. The organic surface mat is mixed with mineral soil, and there is some organic matter in the leached A2 horizon. The Bir horizon of the typical Podzol is too thin and discontinuous to sample in the profile, but there is a slight increase in organic carbon in the B1 horizon. The entire profile is strongly acid.

The cation-exchange capacity is moderately low, and the degree of saturation with bases is low. The Leetonia soils show the highest proportion of illite in the clay minerals of any soils analyzed in this county.

The Montevallo shaly silt loams are thin soils underlain by bedded siltstone, shale, and fine-grained sandstone. These soils are Lithosols that are intergrading toward Sols Bruns Acides. They were formerly included in the Gilpin series, but they have been found to be shallower and more shaly than the Gilpin soils. Both sites sampled are severely eroded, which is typical of this series in this area. Coarse fragments are abundant in both profiles, but sample S 58–Pa–33–4 has softer shale, which has broken down more rapidly than the harder fragments in S 58–Pa–33–14. The bulk density is moderate, and the weight of shale fragments is balanced by the amount of large pores.

The cation-exchange capacity is moderate, and the degree of saturation with bases is moderately low. In sample S 58–Pa–33–4 the quantity of bases decreases with increasing depth, which shows the effect of liming. The site of sample S 58–Pa–33–14 has been idle for a long time, and the surface layer is very acid and low in bases.

General Nature of the Area

This section of the report gives general facts about the county. It tells about the physiography, relief, drainage, geology, climate, and water supply. It also describes the settlement and population, community facilities, transportation, industry, and agriculture. The statistics used are mainly from reports of the U.S. Census of Agriculture.

Physiography, Relief, and Drainage

Jefferson County is within the physiographic province called the Appalachian Plateau. The county is strongly dissected, but the ridgetops are fairly uniform in elevation. The highest point is in the southeastern corner of the county in the foothills of Chestnut Ridge, but the elevation throughout the county ranges from 1,080 to 2,220 feet above sea level.

In the northern part of the county, the ridges adjacent to the major streams are steep and rugged. Farther south, there are also steep areas along Red Bank, Sandy

Jefferson County soils—Continued

Organic carbon	Nitrogen	Carbon-nitrogen ratio	Field reaction	Extractable cations (milliequivalents per 100 grams of soil)					Cation-exchange capacity		Base saturation		Calcium magnesium ratio	Clay mineralogy			
				Ca	Mg	Na	K	H	Sum	NH_4AC	Sum	NH_4AC		Kaolinite	Illite	Chlorite	Vermiculite
Percent	*Percent*		*pH*						*Meq./100 g. of soil*	*Meq./100 g. of soil*	*Percent*	*Percent*					
1.51	0.164	9.2	5.9	5.5	0.3	0.4	0.3	7.9	14.4	13.4	45	48	18.3	xxxx	xx	x	
.60	.073	8.2	5.4	3.1	.5	.4	.3	8.7	13.0	13.1	33	33	6.2	xxxx	xxx	x	
.42	.057	7.4	5.3	2.5	.2	.2	.2	10.4	13.5	12.8	23	24	12.5	xxxx	xxx	x	
.21	.064	3.3	5.3	.8	.3	.3	.2	10.7	12.3	12.7	13	13	2.7	xxx	xxx	x	
2.00	.154	13.0	4.7	1.1	.5	.4	.2	15.0	17.2	16.3	13	13	2.2	xxxx	x	xx	
.59	.077	7.7	5.1	2.2	.5	.4	.2	10.6	13.9	14.6	24	23	4.4	xxxx	xx	x	
.42	.052	8.1	5.1	2.5	1.1	.4	.3	9.4	13.7	14.8	31	29	2.3	xxxx	xx	x	

Lick, and North Fork Creeks. Extensive flats and rolling areas form the upland plateau between drainageways. The steepest area used for farming is near Ringgold. Although the elevation is the highest in the southeastern corner, that area is also one of the smoothest in the county (*3*, *7*).

Nearly all of this county drains westward to the Allegheny River. About 2 square miles in the extreme southeastern corner of the county, however, drains eastward to the Susquehanna River watershed. Nine individual drainage areas cover the watershed of Jefferson County.

The Middle Clarion River drains 58 square miles in the northern section, from the Sigel-Fisher Road through Green Briar to Elk County.

North Fork drains 98 square miles from the Elk County line, near Ross Leffler School of Conservation, south to Pennsylvania Route 28 and along that route to Brookville, north along Pennsylvania Route 36 to Sigel, and northwest through Green Briar to Elk County.

Toby Creek drains 36 square miles from the Elk County line, near Ross Leffler School of Conservation, south to Coal Glen, and east to Clearfield County. It includes the Rattlesnake Run watershed.

Sandy Lick Creek drains 167 square miles from the Clearfield County line about 1 mile south of Lanes Mills and west to Coal Glen. From there it runs north to Pennsylvania Route 28, along that route to Brookville, southeast to Panic, east to the headwaters of Trout Run, and northeast to U.S. Route 322 at the Clearfield County line.

Mill Creek drains 29 square miles from Corsica east to Pennsylvania Route 36, north along that route to a point 1 mile south of Sigel, and west along the Sigel-Fisher Road to the Clarion County line.

Piney Creek drains a triangle of 3 square miles from Corsica northwest along the Clarion County line. Red Bank Creek drains 113 square miles from Corsica east to Pennsylvania Route 36, southeast to Panic, southwest to Frostburg, and west along Pennsylvania Route 536 to Armstrong County.

Mahoning Creek drains 146 square miles from Armstrong County east along Pennsylvania Route 536 to Frostburg, northeast to Panic, east to the headwaters of Buck Run, and northeast to U.S. Route 322 at the Clearfield County line. This area does not include the extreme southeastern corner of the county. The West Branch of the Susquehanna River drains 2 square miles in the extreme southeastern corner of the county.

Geology

Jefferson County is underlain by shale, siltstone, sandstone, conglomerate, limestone, coal, and clay of Paleozoic age. The rocks are of sedimentary origin and are made up mainly of material that was transported and deposited as sediment in water. Some of these rocks were formed under continental conditions, but others, such as the Vanport limestone contain marine fossils.

All of the surface rocks belong to the Pennsylvanian system and the upper part of the Mississippian system of the Carboniferous period (age of coal). They were laid down in nearly horizontal beds and later were bent or folded. Because the area was folded, a given stratum does not occur everywhere at the same elevation. Three geological groups of the Pennsylvanian system and one group of the Mississippian system contain the formations that cover the exposed surface of this county (*2,3,7*).

The Conemaugh group underlies most of the southeastern part of the county and the higher areas of the southwest. The hilltops around Ramsaytown, Westville, and Brockway are capped with rocks from formations of this group. Geologically, these formations are the youngest in the county, and they contain cyclic sequences of red and gray shale and sandstone, thin limestone, and coal. Fine-grained Mahoning sandstone is commonly at the base of the rocks in this group.

The Allegheny group is the most extensive of the geological formations, and it covers more than half of Jefferson County. It lies beneath the rocks of the Conemaugh group and consists of sandstone, shale, limestone, and coal. Within this group are the Freeport, Kittanning, and Clarion formations. Vanport limestone is in the lower part of this group.

The Pottsville group makes up the lowest section of the Pennsylvanian system. The formations cover the Clarion River watershed and the steeper hillsides adjacent to most of the large streams in the northern part of the county. The bedrock is predominantly sandstone and conglomerate, but there is some thin shale and coal of the Mercer formation.

The Pocono group is the only exposed member of the Mississippian system, and it contains the oldest rocks in Jefferson County. These rocks consist of gray, hard, massive conglomerate and sandstone with some shale. They are in small areas near the beds of the large streams in the northern part of the county.

Climate

The climate of Jefferson County is cool and humid. The average annual rainfall is more than 40 inches, and it is fairly evenly distributed throughout the year. In June, July, and August, rainfall is slightly heavier than in the rest of the year. This is significant because these are the months when rainfall is needed most for growing crops. This is also the time, however, when the soils are exposed and protective practices are needed to control erosion. Within a period of years, there is a great fluctuation of precipitation. In summer and in the early part of autumn, periods of low rainfall last long enough in many years to create a droughty condition in most of the soils. Summer rains are of short duration and are usually in the form of thundershowers. Table 10, compiled from records of the U.S. Weather Bureau at Brookville, gives monthly and annual temperature and precipitation typical of those prevailing in the county.

Weather records show that 0.4 of an inch of rain may be expected during a 5-minute period once every 2 years. Rainfall of as much as 0.6 of an inch in 10 minutes can be expected every 2 years. About once in 25 years, 1 inch of rain will fall in 10 minutes. Approximately half the years will have 1 inch of rain in 30 minutes and 1.25 inches of rain in an hour.

TABLE 10.—*Temperature and precipitation at Brookville Station, Jefferson County, Pa.*

[Elevation, 1,417 feet]

Month	Temperature [1]			Precipitation [2]			
	Average	Absolute maximum	Absolute minimum	Average	Driest year (1886)	Wettest year (1885)	Average snowfall
	° F.	° F.	° F.	Inches	Inches	Inches	Inches
January	25.0	70	−29	3.20	3.79	4.53	11.6
February	25.2	70	−32	2.49	1.39	1.60	9.5
March	34.0	83	−26	3.29	1.91	1.52	6.1
April	44.9	91	−5	3.18	2.31	3.16	1.6
May	55.9	98	21	3.76	1.79	7.34	(3)
June	64.1	101	28	4.28	1.63	3.63	0
July	68.1	105	33	4.37	1.79	5.47	0
August	66.0	100	32	3.73	1.16	13.28	0
September	60.3	95	24	3.14	3.13	2.91	0
October	49.6	93	15	2.99	1.11	5.68	.1
November	37.9	76	−9	3.12	4.42	3.72	2.3
December	28.0	67	−23	3.07	1.80	2.64	8.5
Year	46.6	105	−32	40.62	26.23	55.48	39.7

[1] Average temperature based on a 43-year record, through 1955; highest and lowest temperatures on a 22-year record, through 1930.
[2] Average precipitation based on a 64-year record, through 1955; wettest and driest years based on a 60-year record, in the period 1885 through 1955; snowfall based on a 28-year record, through 1930.
[3] Trace.

According to a 27-year record of freezes in spring and a 30-year record of freezes in fall, the average length of the growing season in this county is 116 days. May 27 is the average date of the last freeze in spring, and September 20 is the average date of the first freeze in fall.

The average temperature in winter is slightly below freezing. Summers are warm, and there are a few uncomfortably hot days. Daily temperatures in winter and early in spring vary enough to cause frequent freezing and thawing of the soils. Slopes that have a northern and western exposure are cooler, have earlier frosts, and retain frosts for longer periods than slopes that have a southern or eastern exposure. As a result, the north- and west-facing slopes generally have a sparse cover of vegetation and are subject to heavier frost damage.

Water Supply

Most of this county is underlain by strata of water-bearing sandstone and shale. Where limestone formations occur, the water is usually hard.

Natural springs and dug wells supply water to most of the rural population. Many families also have drilled wells, and a few depend on rainwater that is caught and stored in cisterns. The larger communities have a central water supply with reservoirs and modern filtration facilities.

Although there are numerous streams in all parts of the county, only one major watershed, North Fork, is relatively free from sources of pollution, such as strip mines. The southern two-thirds of the county has been strip mined sporadically, and major operations have taken place in the southern and western parts of the county. Abandoned gas and oil wells that were not properly sealed also contribute to pollution of the water. Many farms in the strip-mining areas have shortages of water, and water for stock and for home consumption must be hauled in by truck. During critical periods, farm ponds are used to supply water for livestock.

Settlement and Population

The area that is now Jefferson County was a part of a large tract of land purchased from the Delaware Indians in 1768 at the Treaty of Fort Stanwix. This tract included most of northern and western Pennsylvania and was later subdivided into large counties. Thirty-five years after this treaty, Jefferson County was formed from part of what was then known as Lycoming County.

Seven years before the county was established, the first white settlement was made in this area. Joseph Barnett and three companions settled at the confluence of Mill Creek and Sandy Lick Creek, where Port Barnett is now located.

In 1830 Brookville was established as the county seat. While the site was still a virgin wilderness, the commissioners of the newly formed county laid out the town at the fork of North Fork and Sandy Lick Creeks, 1 mile west of the first white settlement. This same year, one of the first houses was converted into a hotel. The first tannery was built the following year. In 1835 the first election on record in the county was held.

Lumbering was the chief industry in the early days. The forests had a thick virgin stand of white and yellow pine, hemlock, mixed oaks, chestnut, maple, and many other kinds of trees. Hemlock bark was used in the tanning industry. Wildlife was plentiful. Large animals that lived in the county in its early days included wolves, bear, deer, elk, and wildcats.

When roads and railroads were built, more settlers moved into the area, and farming became more important. The chief crops included wheat, oats, rye, buckwheat, corn, potatoes, and hay. Dairy cattle, horses, pigs, and sheep were among the chief farm animals raised.

In 1950 the population of the county was 49,147, and in 1960 it was 46,792. In 1960 the populations of the largest towns were as follows: Punxsutawney, 8,805; Brookville, 4,620; Reynoldsville, 3,158; Brockway, 2,563; Sykesville, 1,479; and Falls Creek, 1,259.

Community Facilities

Four school jointures replaced the numerous smaller schools that formerly were scattered throughout the county. They are located in Brookville, Punxsutawney, Reynoldsville, and Brockway. Each of these schools is in a fourth-class district and offers industrial arts and special education courses. In addition to the public schools, there are three parochial schools. One is an elementary and secondary school at Punxsutawney; another is an elementary school at Brookville, and the third is an elementary school at Reynoldsville.

Numerous churches of various denominations are scattered throughout the county. There are 11 churches in Brookville, and 20 within a 10-mile radius.

Two hospitals and a medical clinic are located in the county. The Brookville Hospital is at the west end of Brookville, and the Adrian Hospital is in the northern part of Punxsutawney. A small medical clinic is located at Reynoldsville.

Clear Creek State Park is in the north-central part of the county. Facilities for hunting, fishing, swimming, hiking, camping, and picnicking are available at or near the park. Most of the large communities have parks and picnic areas, and some have swimming facilities available. Big Run has a community tennis court. Most of the larger towns have movie theaters, and there is an outdoor theater near Brookville and one near Punxsutawney. Several Granges are active in the county. There is a private golf course north of Punxsutawney and one west of Brookville.

The Ross Leffler School of Conservation, which is owned and operated by the Pennsylvania Game Commission, is 6 miles west of Brockway. It was designed to train game protectors and is one of the first schools of its kind.

Transportation

All parts of Jefferson County are easily accessible by road. There are 3 Federal highways, 12 State highways, and numerous township roads, which dissect the county. At the present time, a four-lane superhighway, the Keystone Shortway, is under construction. This highway will run from east to west, paralleling U.S. Route 322, and will pass through Corsica, Brookville, and Reynoldsville. It will provide a direct route from Sharon, Pa., near the Ohio State line, to Stroudsburg, Pa., near the New Jersey State line.

U.S. Route 119 passes through Punxsutawney and connects Indiana, Pa., with Du Bois. U.S. Route 219 passes through Brockway and connects Bradford with Du Bois. U.S. Route 322 connects Franklin with State College; it goes through Brookville and Reynoldsville. The State routes most heavily traveled in the county are Pennsylvania Routes 36 and 28. Route 36 passes through Punxsutawney and Brookville and connects Altoona with Titusville; and Route 28 passes through Brookville and connects Kittanning with Brockway.

Five railroads provide freight service for Jefferson County. Passenger service is not available on any of them.

Daily bus service is available to Pittsburgh, Cleveland, and New York from Brookville. Punxsutawney has daily bus service to St. Mary's, Altoona, and Pittsburgh. Daily trucking service is also available to those cities.

Two airports are located in the county. A commercial airline provides daily passenger service at the Du Bois-Jefferson County airport, which is 14 miles east of Brookville. The Punxsutawney airport, about 3 miles northeast of Punxsutawney, has limited facilities for small, private aircraft.

Industry

Most of the industrial plants in the county are in or near the larger communities. A wide assortment of products are manufactured. They include glassware, chinaware, radio and television parts, industrial locomotives, steel buildings, gloves, brick and tile, crushed limestone, carbon products, meters, caskets, and charcoal.

Seven permanent sawmills and several portable mills are located in the county, and most of these are in the northern part. Much of the lumber is used locally, but it is also trucked to various parts of the State and to neighboring States. The trees cut are mostly second and third growth and include cherry, hemlock, white pine, and several species of oak and maple.

Farming is more important in the southern and western parts of the county than in other parts. From Brockway southwest through the Beechwoods area, there are several prosperous farms. Many farms in the county are operated by part-time farmers who work in industrial plants for supplemental income.

Gas wells are common throughout the county. A few oil wells of low producing capacity still operate in the north-central part of the county.

Strip mining for coal has been an extensive industry in the county. The topography of the county is marked with many deep cuts, which follow the contour of the hills. Several farms have been stripped for coal, then releveled, and finally returned to farmland. Such areas are not very satisfactory for cultivation, because the structure of the soils has been destroyed, and plant nutrients leach out rapidly. Crops grown on these areas are generally stunted and yield less than those grown on more desirable sites. Permanent hay, pasture, or trees show the greatest potential for use of the areas.

Agriculture

Agriculture in this county grew rapidly, and by 1880 there were 2,576 farms that occupied 154,636 acres. There were about twice as many farms in 1880 as in 1959, and the total acreage farmed was about 16,000 acres greater than in 1959. In 1959 there were only 1,203 farms in the county, and 138,415 acres, or about 33 percent of the county was in farms.

About 20 percent of the county in 1959 was cropland used only for crops and not pastured, and about 3 percent was in pasture used only for grazing. About 60 percent was in trees, and 17 percent was idle, in urban areas, or in water. About one-fourth of the acreage in the county is in capability class III. An explanation of the capability classes is given in the section "Use and Management of the Soils."

As has been the trend in most parts of the country, the number of farms in the county has decreased since agriculture began in that area, and the size of farms has increased. In 1959 the size of the average farm was 115 acres. Table 11 shows the number of farms of various sizes in the county in the years 1950 and 1959. Farms that are between 50 and 99 acres in size are the most numerous. In the past 10 years, the average farm increased about 28 percent in size and nearly doubled in value.

Of the 1,203 farms in the county in 1959, about 80 percent, or 957, were operated by farmers who owned the land. Part owners operated about 17 percent of the farms, and tenants operated about 3 percent. Three farms in the county were operated by fulltime managers.

Livestock

The kinds and numbers of livestock in the county in the years 1950 and 1959 are shown in table 12. In 1959 livestock and livestock products accounted for nearly 83 percent of the farm income derived from the sale of farm products. There was a slight increase in the number of beef cattle in the county in that year, as compared to 1950, and a slight decrease in the number of dairy cattle.

TABLE 11.—*Size of farms*

Size of farms	Number of farms in—	
	1950	1959
Acres		
Less than 50	617	269
50 to 99	651	366
100 to 139	401	223
140 to 179	182	147
180 to 219	65	72
220 to 259	38	38
260 to 499	56	78
500 or more	8	10

TABLE 12.—*Kinds and numbers of livestock*

Livestock	1950	1959
Cattle and calves	17, 005	17, 429
Milk cows	8, 564	7, 326
Steers	1, 302	2, 666
Horses	[1] 1, 229	[2] 482
Hogs and pigs	5, 709	5, 230
Sheep and lambs	562	1, 140
Chickens 4 months old and older	103, 191	125, 435

[1] Includes colts and ponies.
[2] Includes mules.

Agriculture improvement program

Most of the acreage that has been cleared in this county has been subject to moderate erosion. Early farming methods did little to conserve the soils. As a result, as much as 75 percent of the surface layer of soil has been lost in some areas. In places erosion is severe and gullies have cut into the subsoil.

In the early days farmland was relatively cheap. When production was low because of a deficiency in plant nutrients, the farmer moved to a new area. Today research workers have developed scientific farming techniques, crop hybrids, and mechanized farming methods. In Jefferson County the farmers are served by several local, State and Federal agencies that offer technical assistance and information and that provide demonstrations for farming practices that improve soils and soil management. Among these agencies are the following: Jefferson County Soil Conservation District, Soil Conservation Service of the U.S. Department of Agriculture, Pennsylvania State University, Jefferson County Agricultural Extension Association, Agriculture Stabilization and Conservation Committee, Pennsylvania Department of Forests and Waters, Pennsylvania Game Commission, Pennsylvania Fish Commission, Farmers Home Administration, and Pennsylvania Department of Highways.

Farm woodland

On most of the farms in the county, there are small woodlots. When the woodlots are managed properly, they supply the farmers' needs, and they offer a supplemental income with little additional work or financial outlay.

In 1959 about 229 thousand board feet of sawlogs, or about 88 percent of the sawlogs cut, was sold. A total of 184 cords of firewood and fuel wood was cut, and most of this was sold. Other wood products sold included 418 cords of pulpwood, and 23,617 Christmas trees. In addition, about half of the 7,371 fenceposts cut was sold.

Literature Cited

(1) AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS.
1961. STANDARD SPECIFICATIONS FOR HIGHWAY MATERIALS AND METHODS OF SAMPLING AND TESTING: THE CLASSIFICATION OF SOILS AND SOIL-AGGREGATE MIXTURES FOR HIGHWAY CONSTRUCTION PURPOSES. Designation M 145–49, AASHO, Ed. 8, Washington, D.C.

(2) ASHLEY, G. H.
1931. A SYLLABUS OF PENNSYLVANIA GEOLOGY AND MINERAL RESOURCES. Pa. Geol. Survey, Ser. 4, Bul. G–1, 159 pp., illus. Harrisburg.

(3) GRAEBER, C. K., and FOOSE, R. M.
1942. TOPOGRAPHIC AND GEOLOGIC ATLAS OF PENNSYLVANIA, BROOKVILLE QUADRANGLE. No. 54. Dept. of Internal Affairs. 136 pp., illus.

(4) JEFFRIES, C. D.
1946. A RAPID METHOD FOR THE REMOVAL OF FREE IRON OXIDES IN SOIL PRIOR TO PETROGRAPHIC ANALYSIS. Soil Sci. Soc. Amer. Proc. 11: 211–212.

(5) KILMER, V. J., and ALEXANDER, L. T.
1949. METHODS OF MAKING MECHANICAL ANALYSES OF SOILS. Soil Sci. 68: 15–24.

(6) ——— and MULLINS, J. F.
1954. IMPROVED STIRRING AND PIPETTING APPARATUS FOR MECHANICAL ANALYSIS OF SOILS. Soil Sci. 77: 437–441, illus.

(7) LOUGHRY, F. G.
1955. DESCRIPTION OF PENNSYLVANIA PROBLEM AREAS IN SOIL CONSERVATION. U.S. Dept. Agr., Soil Conserv. Serv., 86 pp., illus., Harrisburg, Pa.

(8) PEECH, MICHAEL, ALEXANDER, L. T., DEAN, L. A., and REED, J. F.
1947. METHODS OF SOIL ANALYSIS FOR SOIL-FERTILITY INVESTIGATIONS. U.S. Dept. Agr. Cir. No. 757, 25 pp., illus.

(9) PORTLAND CEMENT ASSOCIATION.
1956. PCA SOIL PRIMER. 86 pp., illus. Chicago.

(10) SCHNUR, G. LUTHER.
1937. YIELD, STAND, AND VOLUME TABLES FOR EVEN-AGED UPLAND OAK FORESTS. U.S. Dept. Agr. Tech. Bul. 560, 88 pp., illus. [Reprinted 1961.]

(11) SOCIETY OF AMERICAN FORESTERS.
1954. FOREST COVER TYPES OF NORTH AMERICA. Rept. of the Committee on Forest Types. 67 pp., illus.

(12) THORP, JAMES, and SMITH, GUY D.
1949. HIGHER CATEGORIES OF SOIL CLASSIFICATION: ORDER, SUBORDER, AND GREAT SOIL GROUPS. Soil Sci. 67: 117–126.

(13) UNITED STATES DEPARTMENT OF AGRICULTURE.
1957. SOIL. U.S. Dept. Agr. Ybk. 784 pp., illus.

(14) ———
1954. PRELIMINARY FOREST SURVEY STATISTICS FOR JEFFERSON COUNTY, PA. U.S. Forest Service, Northeastern Forest Expt. Sta.

(15) ———
1938. SOILS AND MEN. U.S. Dept. Agr. Ybk. 1,232 pp., illus.

(16) ———
1951. SOIL SURVEY MANUAL. Handb. No. 18, 503 pp., illus.

(17) WINTERS, ERIC, and SIMONSON, ROY W.
1951. THE SUBSOIL. Advances in Agron., v. III, illus. New York.

(18) WATERWAYS EXPERIMENT STATION, CORPS OF ENGINEERS.
1953. THE UNIFIED SOIL CLASSIFICATION SYSTEM. Tech. Memo. No. 3–357, v. 1.

Glossary

Aeration, soil. The exchange of air in a soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; but that in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate (soil structure). Many fine particles held in a single mass or cluster, such as a clod, crumb, block, or prism.

Alluvial soil. Soil formed in material, such as gravel, sand, silt, or clay, deposited by a stream of water and showing little or no modification of the original material by soil-forming processes.

Base saturation. The relative degree to which a soil has absorbed metallic cations, such as calcium, potassium, and magnesium. The proportion of the cation-exchange capacity that is saturated with metallic cations.

Calcareous. Containing calcium carbonate or lime.

Cation-exchange capacity. A measure of the adsorptive capacity of a soil for bases, or the amount of bases than can be absorbed by a given amount of soil, expressed in terms of milliequivalents of monovalent cation absorbed from a neutral solution by 100 grams of soil. Generally, a soil with a fairly high cation-exchange capacity is preferred to one with a low exchange capacity because it will retain more plant nutrients and will be less subject to leaching. (Formerly called base-exchange capacity.)

Channery soil. A soil that contains thin, flat fragments of sandstone, limestone, or shale as much as 6 inches in length along the longer axis. A single piece is called a fragment.

Clay. See Texture, soil.

Claypan. A compact, slowly permeable soil layer that contains more clay than the layer above and below it. A claypan is commonly hard when dry and plastic or stiff when wet.

Colluvium. Soil material, rock fragments, or both, moved downhill by creep, frost action, or local wash and deposited at the base of steep slopes.

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; will not hold together in a mass.

Friable. When moist, crushes easily under gentle to moderate pressure between thumb and forefinger and can be pressed together into a lump.

Firm. When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic. When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a wire when rolled between thumb and forefinger.

Sticky. When wet, adheres to other material; tends to stretch somewhat and pull apart, rather than 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 and brittle; little affected by moistening.

Cover crop. A close-growing crop grown primarily to improve the soil and to protect it between periods of regular crop production; or a crop grown between trees in orchards.

Diversion terrace. A channel with a supporting ridge on the lower side, constructed across the slope to intercept runoff and to carry it to a planned outlet. These terraces are maintained in permanent sod.

Drainage, soil. (1) The removal of excess surface or ground water by means of surface or subsurface drains. (2) The effect of soil characteristics that regulate the ease or rate of natural drainage. In Jefferson County a soil is considered well drained when the excess water drains away rapidly and the soil has no mottling or only faint mottling below a depth of 24 inches. The soil is said to be moderately well drained when mottling occurs at a depth between 18 and 24 inches, and it is said to be somewhat poorly drained when mottling occurs at a depth between 12 and 18 inches. A poorly drained soil has a gray surface layer and mottling at a depth between 6 and 12 inches, and a very poorly drained soil has a black surface layer. In a poorly drained or very poorly drained soil, the excess water drains away so slowly that it interferes seriously with tillage or plant growth. (See also Mottled soil.)

Drainage terrace. A relatively deep channel and low ridge constructed across the slope primarily for drainage. It may be either a diversion terrace or a field terrace.

Erosion. The wearing away of the solid material of the land surface by wind, moving water, or ice, and by such processes as landslides and creep.

Normal (geologic). The erosion that takes place on a land surface that has not been disturbed by human activity. It includes (1) the erosion of rocks on which there is little or no developed soil, as in stream channels and on rocky mountains, and (2) normal soil erosion, or the erosion of the soil under its natural condition or under a cover of native plants undisturbed by human activity.

Accelerated. Erosion of the soil or rock over and above normal erosion brought about by changes in the natural cover or ground conditions, including changes caused by human activity and those caused by lightning or rodents. There are several kinds of accelerated erosion. They are (1) sheet erosion, or removal of a more or less uniform layer of material from the land surface. The effects are less conspicuous than those of other types of erosion, the eroding large channels. Frequently, in sheet erosion, the eroding surface consists of numerous very small rills. (2) Rill erosion, or erosion by water, which produces small channels that can be obliterated by tillage. (3) Gully erosion, or erosion by water that produces channels larger than rills. Ordinarily, these channels carry water only during and immediately after rains or following the melting of snow. Gullies are deeper than rills and are not obliterated by normal tillage.

Flood plain. A nearly level area consisting of stream sediment that borders streams and is subject to flooding unless protected.

Fragipan. A dense, brittle subsurface layer very low in organic matter and clay but rich in silt or very fine sand. The layer seems to be cemented when it is dry, is hard or very hard, and has a high bulk density in comparison with the layer or layers above it. When moist, the fragipan tends to rupture suddenly if pressure is applied, rather than to deform slowly. The layer is generally mottled, is slowly or very slowly permeable to water, and has few or many bleached fracture planes that form polygons. Fragipans are a few inches to several feet thick; they are generally below the B horizon and are 15 to 40 inches below the surface.

Graded stripcropping. Growing crops in strips that are graded toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, and covered by grass for protection from erosion; used to conduct runoff away from cropland.

Green-manure crop. A crop grown for the purpose of being turned under in an early stage of maturity, or soon after maturity, for soil improvement.

Horizon, soil. A layer of soil, approximately parallel to the land surface, with distinct characteristics produced by soil-forming processes. Horizons are identified by letters and numbers.

A horizon. The horizon at the surface. It contains organic matter, has been leached of soluble minerals and clay, or shows the effects of both. The major A horizon may be subdivided into A1, the part that has the darkest color because it contains organic matter, and A2, the part that is the most leached and light-colored layer in the profile. In woodland a layer of organic matter accumulates on top of the mineral soil; this layer is called the A0 horizon. Immediately above is the A00 horizon, which is made up of raw leaves and twigs. The depth of the soil, however, is measured from the top of the mineral soil because the A0 horizon is rapidly destroyed if fire occurs or if the soil is cultivated. Where the upper layers of the soil are thoroughly mixed by cultivation, this plow layer is called the Ap horizon.

B horizon. The horizon in which clay, minerals, or other material has accumulated, or that has developed a characteristic blocky, or prismatic structure, that shows color and structure alteration from the parent material, or that shows the characteristics of more than one of these processes. It may be subdivided into B1, B2, or B3 horizons. The B2 horizon may be subdivided further by adding a number to the symbol, such as B21, B22, or B23.

C horizon. The unconsolidated material immediately under the true soil. In chemical, physical, and mineral composition it is presumed to be similar to the material from which at least part of the overlying solum has developed.

D horizon. The stratum beneath the parent material. It may be unlike the parent material of the soil. If it consists of solid rock like that from which the parent material has developed, it is designated as Dr.

Gleyed horizon. A strongly mottled or gray horizon in wet soils. It is designated by the letters BG, CG, or sometimes merely by G. A horizon only slightly gleyed may have the letter "g" added to the symbol.

Humus. The plant and animal residues in the soil that have undergone some appreciable degree of decomposition.

Infiltration rate. The rate at which water penetrates the surface of the soil in a specified time, usually expressed in inches per hour. It may be limited by either the infiltration capacity of the soil or by the rate at which water is applied to the soil surface.

Leached soil. A soil from which most of the soluble material has been removed from the entire profile or removed from one part of the profile and accumulated in another part.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state. In engineering a high liquid limit indicates that the soil has a high content of clay and a low capacity for carrying loads.

Litter, forest. A surface layer of loose, organic debris in forests. It consists of freshly fallen or slightly decomposed organic material.

Loam. A soil consisting of a relatively uniform mixture of sand and silt and a somewhat smaller proportion of clay, generally a desirable quality. Loam texture may be subdivided as sandy loam, loam, silt loam, and clay loam. Specifically, loam is soil material containing 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand.

Mottled soil. Soil irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of 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 these: *Fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension. See also Drainage, soil.

Parent material (soil). The horizon of weathered rock or partly weathered soil material from which the soil is formed; horizon C of the soil profile.

Ped. An individual natural soil aggregate, such as a crumb, prism, or block, in contrast to a clod, which is a mass of soil brought about by digging or other disturbance.

Percolation. The downward movement of water through the soil, especially the downward flow of water in saturated or nearly saturated soil.

Permeability, soil. The quality of a soil horizon that enables water or air to move through it. The following terms used to describe permeability are *very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

Plastic limit. The moisture content at which a soil changes from a semisolid to a plastic state.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range in moisture content over which the soil remains plastic.

Porosity, soil. The degree to which the soil mass is permeated with pores or cavities.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material. See also Horizon, soil.

Reaction, soil. The degree of acidity or alkalinity of a soil expressed in either pH values or in words, as follows:

	pH		pH
Extremely acid	Below 4.5	Mildly alkaline	7.4 to 7.8
Very strongly acid	4.5 to 5.0	Moderately alkaline	7.9 to 8.4
Strongly acid	5.1 to 5.5	Strongly alkaline	8.5 to 9.0
Medium acid	5.6 to 6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1 to 6.5		
Neutral	6.6 to 7.3		

Runoff. Water that flows off the surface of the soil without sinking in.

Sand. See Texture, soil.

Sedimentary rock. A rock composed of particles deposited from suspension in water. The chief sedimentary rocks are sandstone, shale, limestone, and conglomerate.

Shale. A sedimentary rock formed by hardening of clay deposits.

Shrink-swell potential (engineering). The amount that a soil expands on wetting or that contracts on drying. Suggests kinds of clay in a soil.

Silt. See Texture, soil.

Solum. The upper part of the soil profile, above the parent material, in which the processes of soil formation are active. The solum of a mature soil consists of the A and B horizons.

Stripcropping. Growing alternate strips of close-growing crops and clean-tilled crops or fallow on the contour or parallel to terraces.

Structure, soil. The arrangement of primary soil particles into lumps, granules, or other aggregates. Structure is described by grade—*weak*, *moderate*, or *strong*, that is, the distinctness and durability of the aggregates; by the size of the aggregates—*very fine*, *fine*, *medium*, *coarse*, or *very coarse;* and by their shape—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*, or *crumb*. A soil is described as structureless if there are no observable aggregates. *Structureless* soils may be *massive* (coherent) or *single grain* (noncoherent).

Subsoil. The soil layers below the plow layer; the B horizon.

Substratum. The soil material below the surface layer and the subsoil; the C or D horizon.

Texture, soil. The relative proportion of the various size groups of individual soil grains. Textural classes are based on the relative proportion of soil separates—sand, silt, and clay. The principal classes, in increasing order of the content of the finer separates, are as follows: *Sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay*, and *clay*. These may be modified, according to the relative size of the coarser particles, to *fine sand, loamy fine sand, fine sandy loam, very fine sandy loam, coarse sandy loam, gravelly sandy loam, gravelly loam, cobbly loam, sandy clay, stony clay, silty clay*, and *stony loam*. The relative size of soil particles are as follows:

Clay. Small mineral soil grains, less than 0.002 millimeter (0.000079 inch) in diameter.

Silt. Small mineral soil grains ranging from 0.002 millimeter (0.000079 inch) to 0.05 millimeter (0.002 inch) in diameter.

Sand. Small rock or mineral fragments ranging from 0.05 millimeter (0.002 inch) to 2.0 millimeters (0.079 inch) in diameter.

Tile drain. Concrete or pottery pipe placed at suitable spacings and depths in the soil or subsoil to provide water outlets from the soil.

Tilth, soil. The condition of the soil in relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Topsoil. A presumably fertile soil or soil material, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Water-holding capacity. The ability of a soil to hold water that will not drain away but can be taken up by plant roots.

Water table. The highest part of a soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

Weathering. All physical and chemical changes produced in rocks, at or near the earth's surface, by atmospheric agents, and that result in more or less complete disintegration and decomposition.

Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at (800) 457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

Nondiscrimination Statement

Nondiscrimination Policy

The U.S. Department of Agriculture (USDA) prohibits discrimination against its customers, employees, and applicants for employment on the basis of race, color, national origin, age, disability, sex, gender identity, religion, reprisal, and where applicable, political beliefs, marital status, familial or parental status, sexual orientation, whether all or part of an individual's income is derived from any public assistance program, or protected genetic information. The Department prohibits discrimination in employment or in any program or activity conducted or funded by the Department. (Not all prohibited bases apply to all programs and/or employment activities.)

To File an Employment Complaint

If you wish to file an employment complaint, you must contact your agency's EEO Counselor (http://directives.sc.egov.usda.gov/33081.wba) within 45 days of the date of the alleged discriminatory act, event, or personnel action. Additional information can be found online at http://www.ascr.usda.gov/complaint_filing_file.html.

To File a Program Complaint

If you wish to file a Civil Rights program complaint of discrimination, complete the USDA Program Discrimination Complaint Form, found online at http://www.ascr.usda.gov/complaint_filing_cust.html or at any USDA office, or call (866) 632-9992 to request the form. You may also write a letter containing all of the information requested in the form. Send your completed complaint form or letter by mail to U.S. Department of Agriculture; Director, Office of Adjudication; 1400 Independence Avenue, S.W.; Washington, D.C. 20250-9419; by fax to (202) 690-7442; or by email to program.intake@usda.gov.

Persons with Disabilities

If you are deaf, are hard of hearing, or have speech disabilities and you wish to file either an EEO or program complaint, please contact USDA through the Federal Relay Service at (800) 877-8339 or (800) 845-6136 (in Spanish).

If you have other disabilities and wish to file a program complaint, please see the contact information above. If you require alternative means of communication for program information (e.g., Braille, large print, audiotape, etc.), please contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

Supplemental Nutrition Assistance Program

For additional information dealing with Supplemental Nutrition Assistance Program (SNAP) issues, call either the USDA SNAP Hotline Number at (800) 221-5689, which is also in Spanish, or the State Information/Hotline Numbers (http://directives.sc.egov.usda.gov/33085.wba).

All Other Inquiries

For information not pertaining to civil rights, please refer to the listing of the USDA Agencies and Offices (http://directives.sc.egov.usda.gov/33086.wba).