Series 1957, No. 11

Issued October 1961

SOIL SURVEY

Jackson and Mason Counties West Virginia

OUR SOIL ★ OUR STRENGTH

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
WEST VIRGINIA AGRICULTURAL EXPERIMENT STATION

HOW TO USE
THE SOIL SURVEY REPORT

THE PURPOSE of this report is to make information available to anyone who wants to know about the soils of Jackson and Mason Counties and how to use them. Different readers will be interested in different parts of the report. Farmers will be primarily interested in the kinds of soils and in the use and management of these soils on a particular farm. Engineers will be interested in the section Engineering Applications, and foresters, in the section Woodlands.

A soil survey is an inventory of the physical land resources. This report contains a description of each kind of soil and suggestions for its use. The kinds of soil are shown on the detailed soil maps in the back of the report. In making the survey, soil scientists walked over the land. They used a soil auger or spade and examined the different layers of the soil to identify its characteristics. They marked on an aerial photograph the extent of each kind of soil. They described the characteristics of each soil, including its slope and the amount of erosion that had taken place.

Use the index to map sheets to locate a farm or tract of land. Streams, roads, and other landmarks will help in doing this. Each soil area is set off by lines and is marked by a symbol, for example, HaA. The soil for which this symbol stands is identified by the legend that accompanies the maps. Thus, all areas marked HaA are Hackers silt loam, 0 to 3 percent slopes. For a description of that soil, turn to the section Descriptions of the Soils. If interested in the use and management of that soil, note the capability unit given at the end of the soil description and turn to it in the section headed Management by Capability Units.

The Guide to Mapping Units and Capability Units at the end of the report will simplify the use of the map and the report. The guide gives the map symbol for each soil, the name of the soil, the page on which the soil is described, the capability unit in which the soil has been placed, and the page where the capability unit is described.

Fieldwork for this survey was completed in 1957. Unless otherwise specifically indicated, all statements in the report refer to conditions in the county at that time. The soil survey was made as a part of the technical assistance furnished by the Soil Conservation Service to the Western Soil Conservation District.

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SOIL SURVEY OF JACKSON AND MASON COUNTIES, WEST VIRGINIA

FIELDWORK BY JAMES B. RAYBURN, CARL REIBLICK, AND JOSEPH MIR, SOIL CONSERVATION SERVICE, UNITED STATES DEPARTMENT OF AGRICULTURE

REPORT BY JOHN L. GORMAN AND JAMES B. RAYBURN, SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE IN COOPERATION WITH THE DEPARTMENT OF AGRONOMY AND GENETICS, WEST VIRGINIA AGRICULTURAL EXPERIMENT STATION

JACKSON AND MASON COUNTIES are in the western part of West Virginia (fig. 1). The Ohio River

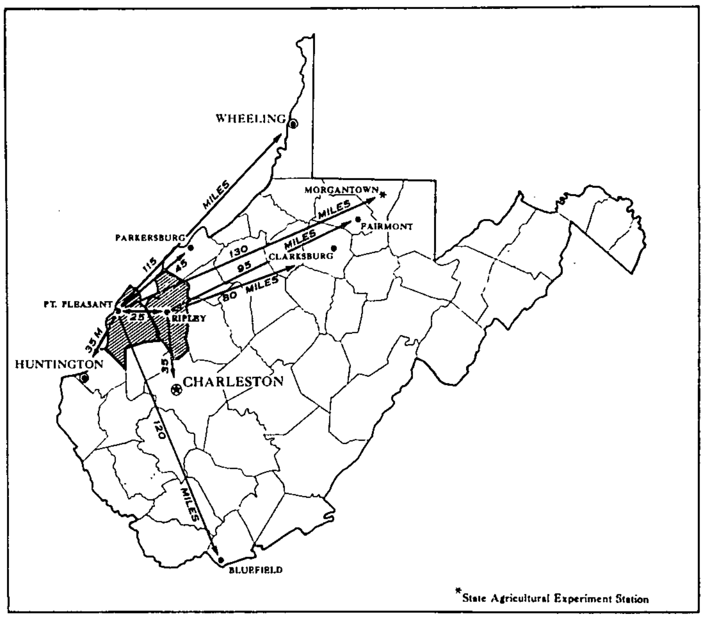

***Figure 1.*—Location of Jackson and Mason Counties in West Virginia.**

forms their western boundary. The two counties have a total acreage of 895 square miles, or 572,800 acres.

These counties are mainly agricultural. Most farms in the uplands are general farms. Those along the Ohio and Kanawha Rivers are larger and are commonly dairy and livestock farms. In recent years other industries have moved into extensive areas along the Ohio River and have provided full-time employment or part-time employment for some farmers.

General Soil Map

The general soil map (shown in color in the back of this report) gives a general picture of the occurrence, association, and extent of the soils in Jackson and Mason Counties. The soils occur in seven broad easily recognized areas. These general areas, also called associations, have fairly clear-cut boundaries. Each general area also has a typical kind of farming and land-use pattern. The areas all contain, to some extent, acreages of soils that are described in other major general areas. They may also have within their boundaries small tracts of the other major general areas. The individual soil areas, the soils on a farm, for example, are shown on the detailed soil map in the back of this report.

1. Ashton-Wheeling-Lakin Association

Association 1 consists of deep, mainly well drained, nearly level, brownish soils of the Ohio River bottom lands and terraces. This general area occurs in a very long band along the Ohio River where it borders Jackson and Mason Counties (fig. 2). The Baltimore and Ohio

***Figure 2.*—Ashton and Lindside soils on bottom lands of the Ohio River. Baltimore and Ohio Railroad in foreground.**

Railroad runs through the entire length of this area, and State Route 2 runs through most of it. The railroad and highway are mainly along the edge of the Wheeling soils nearest the river. The Ashton, Wheeling, and Lakin are the dominant soils in this general area.

The Ashton soils occur on high bottoms subject only to occasional flooding. They are deep, well drained, and for the most part productive. The less extensive, well drained Huntington and the moderately well drained Lindside soils are at lower elevations and are flooded more often. Narrow, swampy areas of poorly drained Melvin soils occur along Route 2.

The Wheeling soils are on terraces that are not flooded. They are deep, well drained, and underlain by gravel and sand deposits. Medium-sized areas of the moderately well drained Sciotoville and small, scattered areas of the poorly drained Ginat and Chilo soils occur in these areas.

The Lakin soils occur as rolling or hummocky, windblown deposits on the eastern side of this area. They are mostly deep, sandy, and droughty.

This area is almost entirely cleared and is important for farming. Dairying, truck crops, and general farming are extensive. The soils, with the exception of the droughty Lakin, are very responsive to lime and fertilizer. The Lindside and Melvin soils can be improved by drainage. If the present trend continues, most of this general area will eventually be used for industrial and urban sites.

2. Lindside-Melvin-Ashton-Zoar Association

Association 2 consists of deep, mainly moderately well drained and poorly drained, nearly level soils of the Kanawha River bottom lands and terraces. The soils of this general area developed on river-deposited materials that occupy a band about a mile wide along the south and west sides of the Kanawha River. Route 17 generally follows the upland or hill boundary of these soils. Most of the area is level to gently sloping, but there are a few sloping areas. A good part of the bottom lands are flooded infrequently. Floods occasionally reach as far as Route 17, a mile from the Kanawha River.

Lindside and Melvin soils make up about two-thirds of the area; Ashton, Zoar, Huntington, and Moshannon make up the rest.

The Lindside soils are level and are on bottom lands that flood infrequently. They are deep, productive, and moderately well drained. The subsoil is usually fine textured, especially in areas distant from the river.

The poorly drained Melvin soils occupy slightly lower areas on the bottom lands. Large areas of these wet, fine-textured soils are typical of this general area. The subsoil is fine textured and hard to drain. Melvin soils warm slowly and are difficult to handle. In many places they occur as swamps between Route 17 and the river.

The Ashton soils are somewhat higher than the Lindside and Melvin soils and in many places occur in long, narrow bands on low ridges. They are subject to flooding only during the highest floods. They are deep, medium textured, and well drained. They are easily worked, very productive, and responsive to management.

The Zoar soils occur on terraces or benches, generally along and south of Route 17. They are above overflow and are nearly level to strongly sloping. These soils are deep and moderately well drained and are subject to erosion. They have a dense, clayey subsoil.

The Huntington soils occur in small areas, generally near the river. The red Moshannon soils occur in small areas along streams that cross the main bottom lands of the Kanawha River. Practically all of this general area has been cleared. Many fields and farms are large. Some of the wettest areas have now grown up in patches of woods and brushland. Dairying, beef cattle production, and general farming are carried on. A large acreage of corn is raised. Drainage is a major problem on the soils of this general area, especially on the Melvin soils. It is difficult to dispose of water from depressed areas. Industry has not moved into this area to any great extent because of the hazard of floods. The system of flood-control dams built and being built on the Kanawha River watershed will lessen the hazard on these soils and benefit farming. It will also encourage the trend toward the industrial use of this land.

3. Moshannon-Senecaville-Markland Association

Association 3 consists of deep, well drained and moderately well drained, nearly level, reddish soils on bottom lands and some yellowish-brown soils on terraces along Sandy and Mill Creeks and along many other small and medium-sized streams. It consists largely of many nearly level areas of bottom land scattered over both counties. The Moshannon, Senecaville, and Markland are the dominant soils (fig. 3).

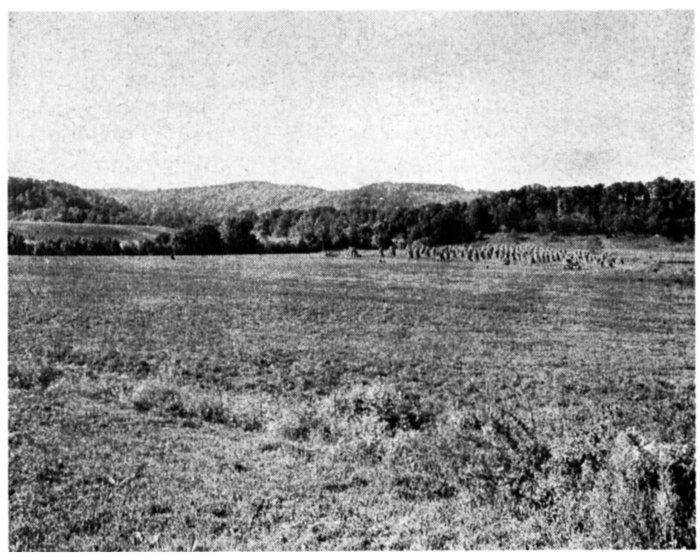

Figure 3.—**Moshannon and Senecaville soils are on bottom lands; Markland soils are on bench in the left background. (Jackson County.)**

Moshannon and Senecaville soils make up most of the areas of the bottom land. The Moshannon soils are deep, reddish, well drained, and productive. They are often subject to flooding. They occur nearest the streams and are by far the most extensive and most widely farmed soils in this association. The moderately well drained Senecaville soils generally occur alongside the Moshannon. They are also good soils but are moderately wet.

Terraces or benches above the streams are made up largely of the strongly sloping Markland soils. The Markland soils are not subject to flooding. They are deep and moderately well drained. They have a fine-textured, lime-influenced, gray subsoil. Very small areas of the level, poorly drained McGary soils occur with the Markland, as well as some small areas of the flat, moderately well drained Monongahela and poorly drained Tyler soils on terraces.

The soils of the many bottom lands that make up this general area are very important to the agriculture of Jackson and Mason Counties. They are productive and very widely cropped. Roads usually run along these bottoms, which can be reached easily by machinery. These soils occur throughout the two counties, and most farms include some of them. On many small farms, they are the best soils for agriculture. Flooding is a problem in many places.

4. Monongahela-Holston-Muskingum-Upshur Association

Association 4 consists of deep, mainly moderately well drained, gently sloping soils on terraces and mixed red and yellowish-brown soils on strongly sloping to very steep uplands in the Upper Flats section. This general area occurs in northern Mason County between the Kanawha and Ohio Rivers (fig. 4). It consists of high, gently sloping flats left by an old river. These flats are cut by small streamheads. Red and gray soils from local shale and sandstone also occur. They are mostly on the strongly sloping to very steep parts of this general area. The dominant soils of the area are Monongahela, Holston, Muskingum, and Upshur.

Monongahela and Holston soils of the terraces occupy much of the flatter parts of this general area. Almost all the acreage has been cleared and is cropped or pastured. Monongahela soils are deep and mainly gently sloping. They are slightly wet and have a hard, brittle layer in the subsoil. Holston soils occur along with the Monongahela soils. They are deep and well drained, and they are usually steeper than the Monongahela soils. Small areas of poorly drained Tyler soils also occur.

The uplands between the smooth terrace areas range from strongly sloping to very steep. The soils of the Muskingum-Upshur complex occupy most of this steeper land. Slopes are bench shaped. These soils are from sandstone and red limy shale. They are gray and red in a very mixed pattern. They have a fine-textured subsoil. This soil complex is characterized by eroded areas and areas of red soil.

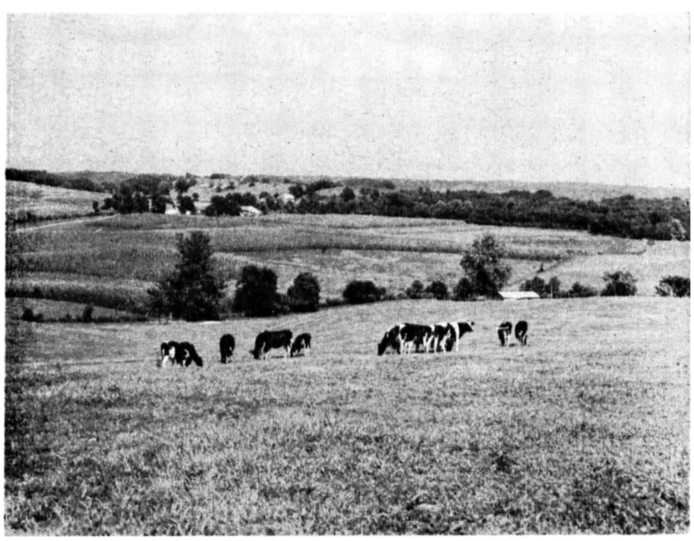

Figure 4.—General view of the Upper Flats in Mason County. Muskingum-Upshur soils in foreground and smooth Monongahela and Holston soils in the middle distance.

Many small areas of the deep, well-drained, productive Vandalia soils occur in this general area at the bottom of slopes.

This area comprises a good farming section of the uplands. It is mostly occupied by many small farms. There are some dairy and beef-cattle farms. The smoother areas are cropped, and the steeper, more eroded areas are commonly pastured. Erosion is active. Much of the steeper part of this general area is in woods.

5. Westmoreland-Brooke-Upshur-Muskingum Association

Association 5 consists of mainly moderately deep, moderately fine textured and fine textured, yellowish-brown soils on small flats and saddles and mixed red and yellowish-brown soils on adjoining steep upper slopes in Jackson County. This general area occurs only in the northeast third of Jackson County. The Westmoreland and Brooke soils occupy the uppermost ridges and small flats and saddles. They are surrounded by the strongly sloping to steep, mixed red and yellowish-brown soils of the Upshur-Muskingum complex.

The Westmoreland soils are moderately deep and yellowish brown and have developed from limestone and limy shale. They are sloping to steep. They are good pasture soils.

The Brooke soils are heavy, sticky, and yellowish brown. They are usually on gentle slopes and saddles. They are hard to plow, and they wash severely, but they are excellent for bluegrass pasture.

The soils of the Upshur-Muskingum complex make up almost all of the slopes that surround the Westmoreland and Brooke soils. They are mostly red and very erosive. They are deep, fine textured, and difficult to plow. They produce good pasture but need good management. Landslips frequently occur on these soils.

This general area is a ridgetop section. Small general farms are the rule. Roads follow the narrow ridges. Dwellings and crop fields are often on the small flats and sloping areas of Westmoreland and Brooke soils. Erosion is very active in this area. Slips and bare eroding pasture areas are common. Many of the steep areas are in woods.

6. Muskingum-Upshur-Vandalia-Tilsit-Wharton Association

Association 6 consists of shallow to deep, mixed soils on gently sloping to very steep uplands and foot slopes; mainly medium-textured, yellowish-brown soils, and some fine-textured reddish soils. This general area occupies over a quarter of the total acreage in Jackson and Mason Counties. It comprises almost all of Mason County south of the Kanawha River. It also occurs in Mason County north of the Kanawha River and in the southern tip of Jackson County. It consists of hilly uplands with moderately wide ridges.

The soils of the Muskingum-Upshur complex make up most of the area. They occur on strongly sloping to very steep hills. The slopes are a series of benches. The Muskingum soils are shallow to moderately deep. They have developed from gray sandstone. They are acid, slightly droughty at times, and only moderately productive. They occur mainly as part of the Muskingum-Upshur complex of soils and make up approximately two-thirds of the area of this complex. The Upshur soils are red, deep, and lime influenced. They have fine-textured subsoils and erode severely. They too are mostly part of the Muskingum-Upshur complex but have a few small, separate areas. The soils of this complex are mainly strongly sloping to steep.

The Vandalia soils occur at the foot of slopes. They have developed from material that was washed from the Muskingum and Upshur soils. The Vandalia soils are well situated and are not very steep. They have a good moisture supply and are productive.

The smooth ridges in this area are mainly occupied by the Tilsit and Wharton soils, which are mapped as undifferentiated units. The ridges are mainly narrow to moderately broad and are not very extensive. The soils are mostly gently sloping and are slightly wet. They have a medium-textured surface soil. Among the layers in the subsoil are dense and hard or heavy clay layers. All areas are cleared and are of average value for cropland.

This general area is deeply dissected and contains many small and medium-sized streams. Reddish bottom-land soils, as described in association 3, are common along these streams.

Small general farms are characteristic of this general area. Roads are fairly numerous. In general, the less steep slopes are in pasture or cropland. Very large areas of woodland occur, especially in the steep or stony sections.

7. Upshur-Muskingum-Vandalia Association

Association 7 consists of moderately deep to deep, mixed soils on strongly sloping to very steep uplands and foot slopes; mainly red, fine-textured soils, and some yellowish-brown, medium-textured soils (fig. 5). This is the largest general area in the two counties. It comprises most of Jackson County and the eastern tip of Mason County. Ridges are narrow to moderately wide and are usually rounded. Slopes range from gently sloping to very steep. Erosion has been very active throughout the area.

The soils of the Upshur-Muskingum complex are the most extensive in this general area. These two soils occur in a very mixed pattern, and it was not practical to map them separately. The Upshur soils make up about two-thirds of this complex. They are deep, red, fine textured, lime influenced, and very erosive. The Muskingum soils make up the rest of the complex. They are mainly moderately deep, yellowish-brown, medium-textured soils developed from acid sandstone. The slopes are a series of benches and are irregular, ranging from moderately steep to very steep. Use is mainly for pasture and woodland.

Separate areas of Upshur soils also occur in this general area. They are on smooth benches and on rounded upper slopes on gently to strongly sloping uplands. These soils are not so steep and do not have so many benches as those of the Upshur-Muskingum complex. The Upshur soils occur on gently to strongly sloping uplands.

***Figure 5.*—Upshur soils occur on the smooth slopes, Upshur-Muskingum on the steeper areas, and Vandalia soils on the lower slopes and in drainageways.**

The reddish Vandalia soils occur in many small areas at the foot of slopes. The material making up these soils has been washed from the Upshur and Muskingum soils. The Vandalia soils are well situated, deep, and productive. The subsoil is fine textured.

This very large area is deeply dissected and contains many small and medium-sized streams. Reddish bottom-land soils, as described in association 3, are common along these streams.

This very extensive general area is typical of much of Jackson and Mason Counties. Ridgetops are approximately at the same elevation. Large acreages of steep and very steep wooded areas occur. Many types of farms are in this area, but most of them are small. Much of the area is in pasture. Severe erosion is extensive. Poor pastures commonly have bare, eroding red spots. A great deal of poor pasture has been allowed to go to woods in the last decade. Some of the smoother sections of this general area are being used for urban and industrial development.

Use and Management of Soils

In this section the nationwide system of land-capability classification is explained, and the soils are grouped in capability classes, subclasses, and units. General management and management by capability units are discussed. Estimated crop yields under two levels of management are given. Some general information about woodlands is included, where applicable, in the capability unit discussions. Further information is given in the section Woodlands.

Capability Grouping of Soils

Capability grouping is a system of classification used to show the relative suitability of soils for crops, grazing, forestry, and wildlife. It is a practical grouping based on the needs and limitations of the soils, on the risk of damage to them, and also on their response to management. There are three levels above the soil mapping unit in this grouping. They are the capability unit, subclass, and class.

The capability unit, which can also be called a management group of soils, is the first level of the capability classification. A capability unit is made up of soils that are similar in kind of management needed, in risk of damage or limitation, and in general suitability for use. The capability unit is represented by a symbol, such as IVe-1 and IVe-3. In these symbols, the Roman numeral indicates the capability class; the lowercase letter, the subclass; and the Arabic numeral, the capability unit.

The next broader grouping above the capability unit is the subclass; it is used to indicate the dominant kind of limitation. The letter symbol "e" indicates that the main limiting factor is risk of erosion if the plant cover is not maintained; "w" means excess water that retards plant growth or interferes with cultivation; and "s" shows that the soils are shallow, droughty, or unusually low in fertility.

The broadest grouping is the land capability class. All the soils in one class have limitations and management hazards of about the same degree, but of different kinds, as shown by the subclass. All the land classes, except class I, may have one or more subclasses.

In classes I, II, and III are soils that are suitable for regular cultivation of the usual annual or short-lived crops.

Class I soils are those that have the widest range of use and the least risk of damage. They are level, or nearly level, productive, well drained, and easy to work. They can be cultivated with almost no risk of erosion and will remain productive if managed with normal care.

Class II soils can be cultivated regularly but do not have quite so wide a range of suitability as class I soils. Some class II soils are gently sloping; consequently, they need moderate care to prevent erosion. Other soils in class II may be slightly droughty, slightly wet, or somewhat limited in depth.

Class III soils can be cropped regularly but have a narrower range of use than those in classes I and II. These need even more careful management.

In class IV are soils that have greater natural limitations than those in class III, but they can be cultivated for some crops under very careful management.

In classes V, VI, and VII are soils that normally should not be cultivated for annual or short-lived crops but that can be used for pasture or range, for woodland, or for wildlife.

Class V soils are nearly level or gently sloping and are not likely to erode but are wet, low in supply of plant nutrients, or otherwise unsuitable for cultivation. None are recognized in these counties.

Class VI soils are severely limited and generally unsuited for the usual cropping systems, but some of them are well suited as producers of forage, as orchards, or as woodlands.

Class VII soils have very severe limitations that restrict their use largely to grazing, woodland, or wildlife.

Class VIII consists of soils that have practically no agricultural use. The soils have value as parts of watersheds, and some have value for wildlife habitats or for scenery. None are recognized in these counties.

Capability classes, subclasses, and units

The soils were grouped into capability units, subclasses, and classes, primarily with reference to their use for crops and pasture. To show the suitability for woodland use, the soils were also grouped in another way according to site quality for upland oaks. (See section Woodlands.)

The capability classes, subclasses, and units in which the soils of Jackson and Mason Counties are classified are defined in the listing that follows. Classes V and VIII are not recognized in these counties.

The soils were assigned to capability units on a statewide basis. Since not all of the capability units in the State are represented in Jackson and Mason Counties, the numbering of the units may not be consecutive. For example, no soils of capability unit IIe-1 are in these counties. Therefore this capability unit is not discussed in this report.

Class I.—Soils that have few limitations that restrict their use.

- Unit I-4.—Nearly level, deep, well-drained, acid soils on terraces.
- Unit I-6.—Nearly level, deep, well-drained, lime-influenced soils on bottom lands; infrequently flooded.

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

- Subclass IIe.—Soils limited by moderate risk of erosion.
  - Unit IIe-4.—Gently sloping, deep, loamy, acid soils on wind-deposited areas and terraces.
  - Unit IIe-6.—Gently sloping, deep, fertile, lime-influenced soils on bottom lands; infrequently flooded.
  - Unit IIe-10.—Gently sloping, shallow to moderately deep, loamy soils on uplands; developed from acid gray sandstone and siltstone.
  - Unit IIe-13.—Gently sloping, deep, loamy soils from acid sandstone and shale; contain fragipan or clayey layers.
  - Unit IIe-15.—Gently sloping, moderately deep to deep soils on uplands and colluvial slopes; developed from limy shale and gray sandstone.
- Subclass IIw.—Soils moderately limited by excess water.
  - Unit IIw-1.—Nearly level, deep soils on terraces and uplands; developed from acid sandstone and shale; fragipan or clayey layers in subsoil.
  - Unit IIw-6.—Nearly level, deep, well-drained, lime-influenced red soils on bottom lands; frequently flooded.
  - Unit IIw-7.—Nearly level, deep, moderately well drained, lime-influenced soils on bottom lands; not limited by flooding.
- Subclass IIs.—Soils moderately limited by droughtiness.
  - Unit IIs-2.—Nearly level and gently sloping droughty, sandy and gravelly soils on terraces along the Ohio River.

Unit IIs-6.—Nearly level and gently sloping, deep, sandy, lime-influenced soils on bottom lands that are infrequently flooded; somewhat droughty.

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

Subclass IIIe.—Soils limited by severe erosion or by moderate or high risk of erosion.

Unit IIIe-4.—Strongly sloping, deep, acid, loamy soils on wind-deposited areas and terraces.

Unit IIIe-6.—Strongly sloping, deep, lime-influenced, fertile, reddish soils on bottom lands; seldom flooded.

Unit IIIe-10.—Strongly sloping, shallow to moderately deep, medium-textured soils on uplands; developed from acid sandstone and siltstone.

Unit IIIe-11.—Strongly sloping, shallow to moderately deep soils on uplands; developed from limestone, sandstone, and shale.

Unit IIIe-12.—Strongly sloping, shallow to moderately deep, sandy soil on uplands; developed from acid sandstone; somewhat droughty.

Unit IIIe-13.—Strongly sloping, deep, acid, loamy soils on terraces; fragipan layer or a heavy clay subsoil.

Unit IIIe-14.—Strongly sloping, deep, moderately well drained soil on slack-water terraces; heavy, limy, clayey subsoil.

Unit IIIe-15.—Gently to strongly sloping, moderately deep and deep soils on uplands and colluvial slopes; developed from limy red shale and sandstone.

Unit IIIe-30.—Gently to strongly sloping, deep, erosive, heavy, lime-influenced soils on upland and colluvial slopes; developed from limy red shale and limestone.

Subclass IIIw.—Soils severely limited by excess water.

Unit IIIw-1.—Nearly level, poorly drained soils on terraces and low bottom land; fine-textured subsoils.

Unit IIIw-5.—Nearly level and gently sloping soils on terraces; fine-textured subsoils.

Subclass IIIs.—Soils severely limited by droughtiness.

Unit IIIs-1.—Soils on sandy, water-deposited or wind-deposited, acid materials; low fertility and droughty.

Class IV.—Soils that have very severe limitations that restrict the choice of plants, require very careful management, or both.

Subclass IVe.—Soils that are severely eroded or are subject to severe erosion; require limited tillage.

Unit IVe-1.—Strongly sloping to moderately steep, heavy, deep, lime-influenced red and yellowish-brown soils on upland and colluvial slopes.

Unit IVe-3.—Strongly sloping to moderately steep, shallow to deep, acid, loamy soils on uplands and terraces; developed from gray sandstone and shale.

Unit IVe-9.—Gently sloping and strongly sloping, deep, acid and lime-influenced, severely eroded soils on terraces; dense, brittle layers in subsoil or fine-textured subsoil.

Unit IVe-15.—Moderately deep to deep, lime-influenced soils on uplands and colluvial areas; developed from red shale and sandstone.

Subclass IVw.—Soils limited by excess wetness.

Unit IVw-1.—Nearly level, deep, poorly to very poorly drained soils with fine-textured subsoils; mainly in low or swalelike areas.

Subclass IVs.—Soils limited by droughtiness.

Unit IVs-1.—Strongly sloping, deep, sandy, droughty soils on wind-deposited materials.

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

Subclass VIe.—Soils that are eroded, moderately deep, and subject to severe erosion.

Unit VIe-1.—Moderately steep and steep, moderately deep to deep soils on uplands; developed from limy red shale, sandstone, and limestone.

Unit VIe-2.—Moderately steep, moderately deep to deep soils from acid materials on terraces, uplands, and areas of wind deposits.

Unit VIe-3.—Moderately steep and steep, shallow to deep soils on uplands and colluvial lands; developed from gray sandstone and limy red shale.

Subclass VIs.—Colluvial soils limited by stones on surface.

Unit VIs-1.—Mainly moderately steep, deep, well-drained soils on colluvial foot slopes below uplands underlain by limy red shale and gray sandstone.

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 that are too steep, badly eroded, stony, shallow, or droughty for use for crops; severe limitations for grazing.

Unit VIIe-1.—Strongly sloping to very steep, nonstony soils on uplands and colluvial slopes; developed from limy red shale and gray, acid sandstone.

Unit VIIe-2.—Steep and very steep, shallow to moderately deep, acid soils from gray sandstone and siltstone; somewhat droughty.

Unit VIIe-3.—Moderately steep, steep, and very steep, very severely eroded soils on uplands; developed from red shale and sandstone; very small individual areas.

Subclass VIIs.—Soils that are too stony, too droughty, and too steep for use for crops; severe limitations for grazing.

Unit VIIs-1.—Steep and very steep, very stony soils; developed from gray, acid sandstone and some red clay shale.

Unit VIIs-2.—Moderately steep to steep, sandy, droughty soils developed from wind-deposited sands.

General Management of Cropland, Pasture, and Woodland

Some broad management practices generally suitable for all soils in a particular land use are as follows:

Cropland:
1. Crops are selected to fit the soil.
2. Need for fertilizer and lime is determined by soil tests; enough fertilizer and lime is applied to produce good yields.
3. Organic matter and tilth are maintained by (a) rotations that include grass and legumes; (b) use of manure and trashy-mulch (crop residues left on the surface) methods of cultivation.
4. Contour stripcropping or contour cultivation is used to conserve water and prevent erosion on sloping soils.

Long-term hay:
1. Grasses and legumes are selected to fit the soil.
2. Need for fertilizer and lime is determined by soil tests; enough is applied to produce good yields.
3. Contour stripcropping, contour cultivation, reseeding by trashy-mulch and other methods are used, as needed, to limit runoff and erosion on sloping land.
4. Proper mowing schedules are adhered to, and mowing very late in fall is avoided.

Pasture:
1. Grasses and legumes suitable for the soil are selected, especially for tall-grass pastures.
2. Contour stripcropping and reseeding by contour cultivation or by trashy-mulch methods are used to limit runoff and erosion on sloping soils.
3. Lime and fertilizer are applied in amounts determined by soil tests so that lack of these amendments does not limit production.
4. Grazing is regulated to maintain a good sod.
5. Cattle are kept off pastures in very wet times to prevent damage by trampling.
6. Water is provided for stock.
7. Weeds and brush are kept cut.

Woodland:

Commonly accepted woodland management and harvest practices apply to Jackson and Mason Counties. For specific suggestions on woodland capability see section Woodlands.

Management by Capability Units

The soils in each of the capability units discussed in this section have generally similar problems and the same general management requirements. The acreage of each capability unit in crops, pasture, forest, and idle areas is shown in table 1.

CAPABILITY UNIT I-4

One soil has been placed in this capability unit. It is nearly level, deep, and well drained and occurs along the Ohio River on nearly level benches above flooding. It is moderately productive. Workability is excellent, and good tilth is rather easily maintained. Because of intensive cropping, this soil is low in potash and, in some fields, low in phosphate.

TABLE 1.—*Acreage of capability units by land use based on complete survey*

JACKSON COUNTY

Capability unit	Crops	Pasture	Forest	Idle	Total
	Acres	*Acres*	*Acres*	*Acres*	*Acres*
I-4	216	54	7	------	277
I-6	1,743	495	111	24	2,373
Total (I)	1,959	549	118	24	2,650
IIe-4	60	78	25	------	163
IIe-6	806	258	71	28	1,163
IIe-10	10	19	--------	9	38
IIe-13	2,703	1,985	276	162	5,126
IIe-15	177	74	18	------	269
Total (IIe)	3,756	2,414	390	199	6,759
IIw-1	705	314	105	18	1,142
IIw-6	8,804	2,371	600	118	11,893
IIw-7	2,520	480	87	4	3,091
Total (IIw)	12,029	3,165	792	140	16,126
IIs-2	675	211	42	15	943
IIs-6	195	24	--------	------	219
Total (IIs)	870	235	42	15	1,162
Total (II)	16,655	5,814	1,224	354	24,047
IIIe-4	190	340	75	29	634
IIIe-6	184	21	20	6	231
IIIe-10	42	100	70	------	212
IIIe-11	72	62	30	------	164
IIIe-12	14	35	9	------	58
IIIe-13	69	16	100	15	200
IIIe-14	111	102	--------	10	223
IIIe-15	212	451	414	38	1,115
IIIe-30	2,609	5,741	3,068	297	11,715
Total (IIIe)	3,503	6,868	3,786	395	14,552
IIIw-1	408	183	9	------	600
IIIw-5	988	520	19	19	1,546
Total (IIIw)	1,396	703	28	19	2,146
IIIs-1	210	166	--------	------	376
Total (III)	5,109	7,737	3,814	414	17,074
IVe-1	7,112	14,780	12,806	412	35,110
IVe-3	131	441	117	10	699
IVe-9	157	219	101	32	509
IVe-15	1,035	1,576	1,617	52	4,280
Total (IVe)	8,435	17,016	14,641	506	40,598
IVw-1	29	29	--------	9	67
IVs-1	47	73	16	------	136
Total (IV)	8,511	17,118	14,657	515	40,801
VIe-1	8,552	33,232	37,150	674	79,608
VIe-2	89	139	70	------	298
VIe-3	751	975	4,426	155	6,307
Total (VIe)	9,392	34,346	41,646	829	86,213
VIs-1	--------	20	--------	------	20
Total (VI)	9,392	34,366	41,646	829	86,233
VIIe-1	3,115	32,582	57,970	463	94,130
VIIe-2	134	504	373	37	1,048
VIIe-3	57	2,392	1,198	------	3,647
Total (VIIe)	3,306	35,478	59,541	500	98,825
VIIs-1	500	6,000	16,113	125	22,738
VIIs-2	--------	90	44	------	134
Total (VIIs)	500	6,090	16,157	125	22,872
Total (VII)	3,806	41,568	75,698	625	121,697
Grand total	45,432	107,152	137,157	2,761	292,502
Miscellaneous					3,488
Miscellaneous land type—Sloping land, alluvial materials					330
Total for county					296,320

MASON COUNTY

Capability unit	Crops	Pasture	Forest	Idle	Total
I-4	1,616	136	10	18	1,780
I-6	4,195	1,201	522	75	5,993
Total (I)	5,811	1,337	532	93	7,773
IIe-4	480	240	132	30	882
IIe-6	1,450	220	142	40	1,852
IIe-10	50	20	30	------	100
IIe-13	3,980	2,150	2,220	300	8,650
IIe-15	350	300	243	30	923
Total (IIe)	6,310	2,930	2,767	400	12,407

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TABLE 1.—*Acreage of capability units by land use based on complete survey*—Continued

MASON COUNTY—Continued

Capability unit	Crops	Pasture	Forest	Idle	Total
	Acres	*Acres*	*Acres*	*Acres*	*Acres*
IIw-1	1, 680	520	244	160	2, 604
IIw-6	6, 430	1, 770	1, 000	130	9, 330
IIw-7	4, 930	1, 790	667	180	7, 567
Total (IIw)	13, 040	4, 080	1, 911	470	19, 501
IIs-2	1, 385	120	10	15	1, 530
IIs-6	440	20		10	470
Total (IIs)	1, 825	140	10	25	2, 000
Total (II)	21, 175	7, 150	4, 688	895	33, 908
IIIe-4	810	1, 080	364	100	2, 354
IIIe-6	340	160	30	20	550
IIIe-10	90	180	111	30	411
IIIe-12	110	90	81	20	301
IIIe-13	410	160	72	50	692
IIIe-14	184	460	200	60	904
IIIe-15	1, 440	2, 920	2, 830	326	7, 516
IIIe-30	1, 520	1, 560	909	140	4, 129
Total (IIIe)	4, 904	6, 610	4, 597	746	16, 857
IIIw-1	2, 490	1, 390	375	250	4, 505
IIIw-5	270	340	40		650
Total (IIIw)	2, 760	1, 730	415	250	5, 155
IIIs-1	630	40	60	430	1, 160
Total (III)	8, 294	8, 380	5, 072	1, 426	23, 172
IVe-1	2, 660	3, 751	5, 042	236	11, 689
IVe-3	610	860	382	120	1, 972
IVe-9	210	702	330	110	1, 352
IVe-15	4, 225	11, 724	11, 930	476	28, 355
Total (IVe)	7, 705	17, 037	17, 684	942	43, 368
IVw-1	1, 110	270	111	70	1, 561
IVs-1	250	50	50	50	400
Total (IV)	9, 065	17, 357	17, 845	1, 062	45, 329
VIe-1	2, 771	7, 467	11, 356	402	21, 996
VIe-2	240	300	331		871
VIe-3	3, 620	15, 600	25, 654	710	45, 584
Total (VIe)	6, 631	23, 367	37, 341	1, 112	68, 451
VIs-1	10	60	10	10	90
Total (VI)	6, 641	23, 427	37, 351	1, 122	68, 541
VIIe-1	1, 396	14, 353	50, 941	270	66, 960
VIIe-2	100	490	705	30	1, 325
VIIe-3	230	1, 248	905	130	2, 513
Total (VIIe)	1, 726	16, 091	52, 551	430	70, 798
VIIs-1	558	4, 597	13, 623	99	18, 877
VIIs-2	30	292	70	10	402
Total (VIIs)	588	4, 889	13, 693	109	19, 279
Total (VII)	2, 314	20, 980	66, 244	539	90, 077
Grand total	53, 988	78, 549	131, 105	5, 158	268, 800
Miscellaneous					7, 330
Miscellaneous land type—Sloping land, alluvial materials					350
Total for county					276, 480

The soil in this unit is:

Wheeling silt loam, 0 to 3 percent slopes.

There are slightly more than 2,000 acres of this soil in Jackson and Mason Counties. All of the acreage is cleared and is being very rapidly taken up for urban and industrial sites. This soil has few limitations beyond the need for good management, and it may be used for all locally grown crops. Organic matter can be maintained, as well as increased, by proper rotations and good crop management. Response to high levels of fertilization is excellent. Most areas need lime.

Crops.—Intensive rotations, such as continuous corn and a good winter cover crop, may be used on this soil. Potatoes, soybeans, and truck crops do well. Cover crops and longer rotations, such as 1 year of hay in 3, help to maintain organic matter. Crop residues should be plowed into the soil. Fertilizer should be applied in amounts determined by tests. This soil returns high yields if the level of fertilization is high. A pH between 6.5 and 7.0 should be maintained by liming. Irrigation is a possibility on this soil.

Long-term hay.—Alfalfa produces good yields on this soil. Alfalfa-grass mixtures should be used. Fertilizer should be applied according to needs determined by tests. A yearly topdressing of a fertilizer high in phosphate and potash is needed to produce good yields and to help maintain the stand longer. A pH between 6.5 and 7.0 should be maintained by liming.

Pasture.—Tall-grass pasture has the same fertilizer and lime needs as long-term hay. Alfalfa-grass mixtures are desirable. Ladino clover may be added to the mixture. Grazing control, proper stocking, and mowing to control lush growth and weeds help maintain stands.

Permanent pastures of bluegrass and clover make a good sod on this soil. A pH of 6.0 to 6.5 should be maintained. Fertilizer should be applied according to tests. Pastures need a topdressing of fertilizer high in phosphate and medium in potash every 2 years. Application of nitrogen fertilizer in late winter will produce vegetation for grazing early in spring. Industrial areas located on this soil may need permanent sod. Bluegrass or tall-fescue sods may be grown. They should be fertilized and limed in amounts determined by soil tests.

CAPABILITY UNIT I-6

This unit consists of nearly level, deep, well-drained, lime-influenced soils on bottom lands. Flooding is infrequent. The Huntington soil is flooded about once in 5 years; the others are flooded by only the highest waters. Floodwaters are not extremely swift, and scouring is not extensive. Runoff is slow or medium, as most of the water penetrates the soil. These soils are high in natural productivity. Organic matter is fairly high in quantity, and it is noticeable throughout the profile. The moisture-holding capacity is high. Soils in this unit have developed from materials that washed from uplands containing some lime and are usually only medium acid in the subsoil.

Soils in this unit are:

Ashton silt loam, 0 to 3 percent slopes.
Hackers silt loam, 0 to 3 percent slopes.
Huntington silt loam, 0 to 3 percent slopes.

There are about 8,000 acres of these soils in Jackson and Mason Counties. More than 90 percent of the acreage is cleared and is mainly in tilled crops. These are probably the best soils in the two counties for crops and are suited to all those grown locally. Flowers and other specialty crops are grown successfully. Cabbage, tomatoes, and other truck crops are also suited. The soils parallel streams, occur along good roads, and are accessible to farm machinery and well suited to its use. Some areas, especially of the Ashton soil, are used for urban and industrial sites.

Crops.—These soils can be used intensively if enough fertilizer is applied and tillage methods are normally good. Continuous row crops may be grown if a winter cover crop is used. A very high level of management, cropping intensity, and fertilization is justified on these soils. High yields can be expected. A hay crop every 4 to 5 years will improve tilth and maintain organic matter. Small, wet spots may need tile or open drainage. Some narrow strips, especially of the Huntington soil near the Ohio River, flood often enough to require careful choice of tilled crops and time of planting. A pH of 6.5 to 7.0 should be maintained by liming. Irrigation may be practiced if management is at a high level and very high yields are desired.

Long-term hay.—Mixtures of alfalfa and grass yield very well on these soils. Stands can be made to last longer by adequate initial fertilization and annual topdressing with fertilizers high in phosphate and medium in potash. These soils have very few limitations. Proper mowing schedules and fertilization are especially important. A pH of 6.5 to 7.0 should be maintained by liming.

Pasture.—These soils are well suited to tall-grass pasture. Mixtures of alfalfa and grass to which ladino clover is added are preferred. Proper grazing schedules and mowing to control rank growth and weeds are needed. Fertilizer and lime requirements are the same as for long-term hay.

Permanent bluegrass pastures are needed on some of these soils. Grazing should be controlled to permit recovery of the bluegrass, and mowing is necessary to control weeds and rank growth. These pastures need topdressing every 4 years with a fertilizer high in phosphate, and liming to maintain a pH between 6.0 and 6.5.

CAPABILITY UNIT IIe-4

The soils in this unit consist of water-laid or wind-deposited materials. They are gently sloping, deep, and well drained and are above floodwaters. Most areas are in rather narrow strips, generally paralleling the Ohio River. Some are slightly hummocky. Soils of this unit are medium textured and have moderate to high moisture-holding capacity. Productivity is medium. Some fields are low in nutrients because of intensive cropping.

Soils in this capability unit are:

Duncannon silt loam, 3 to 8 percent slopes.
Wheeling silt loam, 3 to 8 percent slopes.

About 1,000 acres of these soils occur in Jackson and Mason Counties. They can be used for all locally grown crops. They are excellent for long-term hay and pasture. They work easily and can be kept in good tilth by using proper rotations. Organic matter should be maintained and erosion controlled.

Crops.—It is common practice to farm these soils as a unit with Wheeling silt loam, 0 to 3 percent slopes (capability unit I-4). On areas large enough to be handled alone, rotations that include at least 1 year of hay in every 3 years are useful. The longer slopes need contour cultivation and stripcropping to control runoff. Winter cover crops should be used where needed. Fertilizer should be applied in amounts determined by soil tests. A pH between 6.5 and 7.0 should be maintained by liming.

Long-term hay.—Alfalfa mixtures do well on these soils. This deep-rooted legume will improve the content of organic matter, yield well, and effectively control runoff on these soils. Fertilizer should be used at time of seeding in amounts determined by soil tests. Yearly topdressing with a fertilizer high in phosphate and potash will promote good growth and insure high yields. A pH of 6.5 to 7.0 should be maintained by liming.

Pasture.—Tall-grass pasture does well on these soils. It has the same fertilizer and lime needs as long-term hay. Alfalfa mixtures are also well suited. Mixtures of orchardgrass or tall fescue with ladino clover are successful. Ladino clover in the mixture insures better grazing. Careful grazing management is needed to prevent damage to pastures grown from these mixtures.

Permanent pastures of bluegrass and whiteclover do well on these soils. They do not produce as much forage as tall-grass pasture but may be needed as feedlots. A pH of 6.0 to 6.5 should be maintained by liming. Fertilizer should be applied in amounts determined by soil tests. A topdressing of fertilizer high in phosphate and medium in potash is needed every 2 years. Bluegrass or tall fescue may be used for permanent sod on industrial areas located on these soils. They should be limed and fertilized in amounts determined by soil tests.

CAPABILITY UNIT IIe-6

This unit consists of gently sloping, well-drained soils influenced by lime. They occur on bottom lands. Floods are infrequent and are not a serious limitation. These soils have medium runoff and high moisture-holding capacity. Their productivity is high.

Soils of this unit are:

Ashton silt loam, 3 to 8 percent slopes.
Hackers silt loam, 3 to 8 percent slopes.
Moshannon silt loam, 3 to 8 percent slopes.

Moshannon silt loam, 3 to 8 percent slopes, is more subject to flooding and receives more surface water from soils at higher elevations than the other soils in this unit.

The soils in this capability unit total about 3,000 acres in Jackson and Mason Counties. Almost all of the acreage has been used mainly for crops, but a small part is in pasture. These soils are suited to all locally grown crops, as well as to pasture. Truck and specialty crops do well. Simple conservation measures are needed to control runoff and erosion.

Crops.—Rotations with at least 2 years of hay in every 4 will limit runoff and erosion. Long slopes need contour farming or stripcropping. Winter cover crops are necessary on bare areas. Seep spots may be drained by tile. Hay mixtures should be fertilized in amounts determined by soil tests and topdressed annually with fertilizer high in phosphate and medium in potash. A pH between 6.5 and 7.0 should be maintained by liming.

Long-term hay.—Alfalfa-grass mixtures are very well suited to these soils. Meadows of alfalfa and grass control runoff well but need reseeding on the contour. Fertilizer should be applied in amounts determined by soil tests, and a topdressing high in phosphate and medium in potash should be used annually. A pH of 6.5 to 7.0 should be maintained by liming. Natural grass waterways require careful maintenance and extra fertilizer. Mowing of alfalfa in late fall should be avoided.

Pasture.—Tall-grass mixtures produce good pastures on these soils. Alfalfa and grass, as well as ladino clover and grass mixtures, do well. Fertilization and liming are the same as for long-term hay. Tall-grass pastures need careful stocking and grazing control. Weeds can be controlled by mowing.

Permanent bluegrass pastures do well on these soils. A pH of 6.0 to 6.5 should be maintained by liming. A topdressing with phosphate fertilizer is needed at least every 4 years. Application of nitrogen fertilizer on bluegrass late in winter will increase forage early in spring for dairy or beef cattle. Watering facilities for livestock should be provided.

CAPABILITY UNIT IIe–10

Only one soil has been placed in this capability unit. It is a gently sloping, shallow to moderately deep soil on uplands, mainly in Mason County. It occurs in small areas near the tops of rounded ridges. This soil has developed from sandstone and siltstone and is only moderately productive. It has moderate moisture-holding capacity. It is strongly acid.

The soil in this unit is:

Muskingum silt loam, 3 to 10 percent slopes.

This soil has a total area of less than 200 acres. It can be used for crops, hay, or pasture. Runoff and erosion are moderate problems. This soil is normally farmed with adjoining areas of Muskingum-Upshur soils on similar slopes.

Crops.—Corn, grain, and hay, or corn, grain, and 2 years of hay, is a suitable rotation for this soil. Contour cultivation and stripcropping should be used to prevent excessive runoff and erosion. Fertilizer should be applied according to the need of the crop grown. The amount should be determined by soil tests. This soil should be limed to a pH of 6.5 to 7.0.

Long-term hay.—Alfalfa-grass mixtures yield fairly well on this soil. A pH of 6.5 to 7.0 must be maintained for best results. Fertilizers high in phosphate and medium in potash are also needed. The amount should be determined by soil tests.

Pasture.—Tall-grass pastures have some use on this soil. Management and fertilizer requirements are the same as for long-term hay.

This soil generally produces good permanent bluegrass pasture but at times is a little too droughty. Normally pastures also include other soils, usually Muskingum-Upshur, but are managed as one unit. A pH of 6.0 to 6.5 should be maintained, and a topdressing of phosphate fertilizer should be applied every 4 years. Small, eroded spots in this soil may need mulching, extra fertilizer, and seeding.

CAPABILITY UNIT IIe–13

The soils in this unit are deep, but they have either a dense, brittle layer or heavy clay layers in their subsoils. These layers partially restrict water penetration, aeration, and root growth. This unit includes soils on waterlaid terraces on stream benches above overflow and on the Upper Flats. It also includes gently sloping soils developed from gray sandstone and shale. The soils in this unit are moderately wet. Runoff is medium to high, although in some very small areas it is slow or even ponded. Moisture-holding capacity is medium. These soils are strongly leached, and they are low in available potash and in available phosphate. They are naturally strongly acid throughout.

Soils in this unit are:

Monongahela silt loam, 2 to 6 percent slopes.
Sciotoville silt loam, 3 to 8 percent slopes.
Tilsit and Wharton silt loams, 3 to 8 percent slopes.
Zoar silt loam, 2 to 6 percent slopes.

These soils occupy over 13,000 acres in Jackson and Mason Counties. Over two-thirds of the acreage is in crops and pasture. Woods occur on small tracts. Long-term hay and pasture may also be used. Control of runoff and erosion is needed. A sizable acreage of these soils, especially of the Sciotoville, is being taken over for urban use.

Crops.—Rotations that include hay at least 1 year in 3 are needed on these soils to control runoff and maintain good tilth. Mixtures of red clover and grass or alfalfa and grass are suitable for the hay crop. Except in some wet years, corn grows well. Small grain may be expected to produce rank growth and to lodge to some extent. Cover crops are necessary on these soils to improve structure and to help prevent runoff. All crops should be fertilized in amounts determined by soil tests. Fertilizer high in phosphate and potash is needed as an annual topdressing for hay. A pH of 6.5 to 7.0 should be maintained by liming.

Contour farming and stripcropping on long slopes are needed. Diversion terraces have been successfully used on long slopes. Wet and seepy spots can be corrected by tile or open drainage. Natural waterways should be kept in sod. Small eroded areas require mulching and seeding and other special measures.

Long-term hay.—These are not the best alfalfa soils. Alfalfa stands are likely to be short lived. Alfalfa will require very careful management. Mixtures of legumes and grass that contain species tolerant to excess moisture, such as orchardgrass and ladino clover, have been used successfully on these soils. Wet spots may be drained by tile or open ditches. Very late cutting should be avoided, as it may shorten the life of the stand. An annual topdressing of fertilizer high in phosphate and potash is needed. Waterways should be kept in sod. Very small, eroded spots are rather common on some of these soils and need mulching and seeding. Extra fertilizer is also needed. A pH of 6.5 to 7.0 should be maintained by liming.

Pasture.—Tall-grass pasture needs special care. Stock should be kept off when soil is wet, and grazing needs careful regulation. Mixtures of orchardgrass and ladino clover, or of tall fescue and ladino clover, may be used. Fertilizer should be applied in amounts determined by soil tests. Pasture, like long-term hay, should be topdressed annually. A pH of 6.5 to 7.0 should be maintained.

If properly managed, permanent bluegrass pastures produce moderately good yields and control runoff and erosion well. They need a topdressing with fertilizer high in phosphate and medium in potash every 2 years. Mowing is necessary to control weeds and rank growth. Stock should not be put on these pastures until grass is 4 inches high and the ground is firm. Winter grazing should be avoided except in feedlots. A pH of 6.0 to 6.5 should be maintained by liming.

CAPABILITY UNIT IIe–15

Most of the acreage of the soils in this unit is in Mason County south of the Kanawha River and in the southeast tip of Jackson County. These soils are gently sloping, have medium to rapid runoff, and are medium in productivity.

Soils in this capability unit are:

Muskingum-Upshur silt loams, 3 to 10 percent slopes.
Vandalia silt loam, 3 to 8 percent slopes.

Muskingum-Upshur silt loams, 3 to 10 percent slopes, developed on uplands from limy, red shale and acid, gray sandstone. Vandalia silt loam, 3 to 8 percent slopes, developed at the foot of slopes on material accumulated from these uplands. The Muskingum-Upshur soils are mostly moderately deep to deep but have some shallow areas. The Vandalia soil is usually deep.

The soils in this unit have a total area of about 1,100 acres. About half of the acreage is in cropland, and the rest is in pasture and woods. These soils are suited to many locally grown crops, including tobacco. Runoff, as well as erosion control, is a moderate problem. The soils are also suited to long-term hay and pasture.

Crops.—Corn, wheat, oats, tobacco, and other tilled crops common to the area are grown on these soils. Control of water and erosion is important. Rotations that include hay at least 1 year in 3 are necessary; those that include 2 years of hay in 4 are preferred. Cover crops should be grown where needed to protect the soil during winter. Contour farming and contour strips should be used on long slopes to control runoff. Diversion terraces may be needed to break long slopes and divert water. Small eroded spots need applications of manure and fertilizer, diversion of water, and special care in mulching.

Long-term hay.—These are good soils for alfalfa-grass mixtures. Runoff and erosion can be controlled by seeding on the contour and in contour strips on long slopes. Annual topdressing with fertilizer high in phosphate and medium in potash is desirable. A pH of 6.5 to 7.0 should be maintained by liming. Water from hilly areas may have to be diverted from some of these soils.

Pasture.—Tall-grass pasture provides protection and good forage. Alfalfa-grass mixtures to which ladino clover is added are suitable for these soils. Another suitable mixture is orchardgrass with ladino clover. Pastures can be fertilized like long-term hay. Grazing must be controlled; mowing will help control weeds and rank growth.

Bluegrass pastures grow well on these soils. Normally, tall-grass pastures or meadows will revert to bluegrass and whiteclover. Phosphate fertilizer should be added at least every 4 years, and a pH of 6.0 to 6.5 should be maintained by liming. Mowing improves bluegrass pasture. Grazing livestock should be provided with water. Stockwater ponds have usually been satisfactory on these soils.

CAPABILITY UNIT IIw-1

In this unit are nearly level, moderately well drained soils on Ohio River terraces, on the high Upper Flats mostly in Mason County, and on broad ridges throughout both counties. These soils are deep, but they have either a firm, brittle layer or a fine-textured layer in their subsoil. Such layers restrict the penetration and movement of water and also partially restrict the deep growth of roots. Runoff is medium except in depressed areas, where it is slow or slightly ponded. The surface soils have weak structure and tend to become massive and form weak crusts. The soils in this unit are strongly leached, and they are generally low in organic matter and plant nutrients, especially potash.

Soils in this unit are:

Monongahela silt loam, 0 to 2 percent slopes.
Sciotoville silt loam, 0 to 3 percent slopes.
Tilsit and Wharton silt loams, 0 to 3 percent slopes.

The soils in this unit have a total area of nearly 4,000 acres. Almost all of the acreage has been cleared, and more than half is now being used for cropland. The soils in this unit are suitable for crops, but selection of crops and spot drainage are needed. These soils may also be used for long-term hay of suitable legumes and grasses and for permanent pasture.

Crops.—A 4-year rotation that includes 2 years of hay is needed on these soils to maintain organic matter and improve tilth. Corn and wheat grow fairly well on these slightly wet soils if adequately fertilized. The amount should be determined by soil tests. The hay should receive an annual topdressing of fertilizer that is high in phosphate and potash. A pH of 6.5 to 7.0 should be maintained by liming these naturally strongly acid soils.

Drainage of small seep spots and poorly drained areas by tile is beneficial. Interceptor drain tiles and diversion ditches may be used to cut off seepage and surface water.

Long-term hay.—Water-tolerant legumes, such as ladino clover and alsike clover, do better than alfalfa on these soils. However, under careful management, mixtures of alfalfa and grass may be grown with reasonable success. Mixtures of orchardgrass with ladino clover have been successful on these soils. Fertilizer should be applied at time of seeding in amounts determined by soil tests. A topdressing of fertilizer high in phosphate and potash should be used annually. A pH of 6.5 to 7.0 should be maintained. Seep and wet spots should be drained by tile. Intercepting ditches may be needed.

Pasture.—Tall-grass pasture that includes water-tolerant legumes has some limited use on these soils. Very careful grazing and mowing are needed to maintain these stands. Mixtures of orchardgrass with ladino clover may be used. Lime and fertilizer requirements for pastures are similar to those for long-term hay. Careful grazing management is required.

Every 2 years permanent bluegrass pasture needs fertilizer high in phosphate and medium in potash. A pH of 6.0 to 6.5 should be maintained by liming. Pastures should not be grazed until the soil is firm and dry and grass is about 4 inches high. They should be mowed to control weeds and rank growth.

CAPABILITY UNIT IIw-6

Only one soil is in this unit. It is a deep, well-drained, reddish-brown or dark-brown soil on bottom lands subject to flooding. It is one of the most widely and uniformly distributed soils in Jackson and Mason Counties. Floods vary in frequency, but usually occur once in 2 or 3 years. Some of these bottoms, however, flood yearly or more often. Floodwaters are swift and are a limiting factor on this soil. Although the depth varies, this soil is deep in most places and has a high moisture-holding capacity. This is a very productive soil. It has received some lime-influenced deposits and is only medium to slightly acid.

The soil in this capability unit is:

Moshannon silt loam, 0 to 3 percent slopes.

This is an extensive unit consisting of more than 20,000 acres. It occurs on narrow bottom lands, and small acreages are on a great many farms. About three-fourths of this soil is in crops; the rest is mostly in pasture. About a thousand acres are in woods. The wooded areas are usually flooded yearly or more often and are grazed in most places. This soil is well suited to crops with some restrictions and is very good for hay and pasture.

Crops.—This is an important soil for crops. All locally grown crops except tobacco are suitable. Flooding is a local problem in each area, and local experience determines the choice of tilled crops and time of planting. Because of the risk of damage by floods, tobacco is not grown. This is the best soil for tilled crops on many small farms, and on some farms it is the only one suitable for them. Rotations should be selected to meet local needs. On some areas continuous corn followed by winter cover may be used. In other areas longer rotations in which hay is grown more often are needed to protect the soil from damage by floods. Lime may be needed to keep the pH between 6.5 and 7.0. Some areas need measures to protect streambanks and improve stream channels.

Long-term hay.—Long-term hay is very well suited to this soil. Mixtures of alfalfa and grass yield well and protect the soil against damage by floods. Areas in fields that flood frequently may be seeded to a mixture of ladino clover and tall fescue or orchardgrass. Seep spots may be drained by tile. Fertilizer should be applied in amounts determined by soil tests. Fertilizer high in phosphate and medium in potash should be used annually for topdressing. A pH of 6.5 to 7.0 should be maintained by liming.

Pasture.—Tall-grass pasture consisting of long-term hay mixtures and ladino clover grows well. Reed canarygrass, especially in seepy spots, and mixtures of tall grass and ladino clover may also be used. Fertilizer and lime requirements are about the same as for long-term hay.

Bluegrass pastures also yield well on this soil and hold flood damage to a minimum. Phosphate fertilizer should be added every 4 years. A pH of 6.0 to 6.5 should be maintained by liming. Mowing to control weeds is beneficial. Grazing management also improves these stands. Some areas need measures to protect streambanks.

Woodland.—Small areas of woodland are maintained where this soil is flooded or receives excessive hill water. Most areas are within a pasture boundary and are heavily grazed. Many of these woodlands consist mainly of sycamore trees.

CAPABILITY UNIT IIw-7

This unit consists of deep, moderately well drained, lime-influenced soils on bottom lands. They are productive soils with moderately slow to slow permeability and medium to high moisture-holding capacity. Runoff is medium in most areas, but it is slow or slightly ponded in some low areas.

Soils in this unit are:

Lindside silt loam, 0 to 3 percent slopes.
Senecaville silt loam, 0 to 3 percent slopes.

The Lindside soil occurs along the Ohio and Kanawha Rivers; flooding is infrequent and is not a limiting factor. The Senecaville soil occurs along smaller streams. This soil may flood once in 2 or 3 years, and local damage from floods may be a hazard.

These soils have a total area of more than 10,000 acres. They are important agricultural soils. About three-fourths of the acreage is used for crops. Long-term hay, as well as permanent pasture, is suitable for these soils. Lindside silt loam, 0 to 3 percent slopes, is a very important soil on dairy or beef cattle farms along the Kanawha River.

Crops.—In most years, including dry ones, corn does well on the soils of this unit. Some years, however, are too wet for best yields of corn. Wheat and soybeans are also suitable. Drainage systems are needed in some areas. Seep spots and very wet spots need local drainage. Open drains for outlets may be necessary in places. Some areas of the Lindside soil are a long distance from the river, and cooperative efforts are often needed to construct drainage outlets across more than one farm. Rotations that include 1 year of hay in 3 are desirable. Cover crops help maintain organic matter and improve tilth. Fertilizers should be applied according to needs determined by soil tests. Although these soils are lime influenced, some areas need lime. A pH of 6.5 to 7.0 should be maintained.

Long-term hay.—These soils are used extensively for long-term hay. Alfalfa mixtures yield well, but stands do not last as long as on well-drained soils. Alsike clover, ladino clover, and some other water-tolerant legumes may improve stands. Drainage systems and spot drainage improve these soils for long-term hay. Annual topdressing with fertilizer that is high in phosphate and medium in potash improves yields and lengthens life of stands. Mowing very late in fall should be avoided. A pH between 6.5 and 7.0 should be maintained by liming.

Pasture.—These soils are well suited to tall-grass pasture. Alfalfa mixtures to which ladino clover has been added may be used. Mixtures of orchardgrass and ladino clover are successful. Grazing should be carefully managed. Very early grazing when the ground is still wet should be avoided. Fertilizer and lime requirements are the same as for long-term hay.

Bluegrass sod does well on these moderately well drained soils. Pastures of tall fescue may also be grown, especially around feedlots where excessive trampling may be expected. Grazing should be controlled to permit growth and recovery of the stand. Weeds should be controlled by mowing. Phosphate fertilizer should be applied every 4 years. A pH between 6.0 and 6.5 should be maintained by liming.

CAPABILITY UNIT IIs-2

This unit consists of deep, moderately coarse textured to coarse textured soils on terraces along the Ohio River. These soils are above the level of floods. They are underlain by gravel and sand deposits. Small gravel pits are common, especially on the coarse subsoil variants of Wheeling gravelly sandy loam, which are very shallow to gravel. The soils of this unit are somewhat droughty to droughty. They have slow runoff, as most of the water penetrates the soil. They are medium to low in productivity and tend to be low in organic matter and potash. The moisture-holding capacity is low.

Soils in this unit are:

Wheeling fine sandy loam, 0 to 3 percent slopes.
Wheeling fine sandy loam, 3 to 8 percent slopes.

Wheeling gravelly sandy loam, coarse subsoil variant, 0 to 3 percent slopes.
Wheeling gravelly sandy loam, coarse subsoil variant, 3 to 8 percent slopes.

These soils cover about 2,500 acres in Jackson and Mason Counties. They are being very rapidly withdrawn from agriculture and used for urban and industrial sites. The soils of this unit warm early in spring and are easily worked. A typical area of Wheeling gravelly sandy loam, coarse subsoil variant, is farmed at the Lakin State Industrial School in Mason County.

Tilled crops.—These soils will produce corn, wheat, potatoes, and specialty crops. Yields are good if the soils are fertilized, but they are reduced in dry years. Irrigation may be practical on sweet corn or other intensively managed crops. Contour cultivation helps control runoff on the gently sloping areas. Rotations with at least 1 year of hay in 3 are desirable. Well-fertilized cover crops will add organic matter. All crops should be fertilized in amounts determined by tests. A pH of 6.5 to 7.0 should be maintained by liming.

Long-term hay.—Alfalfa mixtures are well suited to these soils. They root deeply and yield moderately well. Irrigation may be practiced successfully. These soils are responsive to fertilizers that contain phosphate and potash. The amounts applied should be determined by soil tests. An annual topdressing with fertilizer that is high in phosphate and potash increases yields and the length of stands. A pH between 6.5 and 7.0 should be maintained by liming.

Pasture.—Pastures are not extensive on these soils. Tall-grass pasture has better yields and is better able to stand drought than bluegrass pasture. Liming, fertilizing, and seed mixtures for tall grass are the same as for long-term hay.

Bluegrass pastures are very limited on these soils. They do not produce high yields in droughty periods. Tall fescue is more resistant to drought and may prove successful on these soils.

Permanent sod is needed for industrial sites on these soils. Bluegrass mixtures will do well if the soils can be irrigated. Tall-fescue mixtures are suitable. A pH of 6.0 to 6.5 should be maintained by liming. A topdressing that is high in phosphate and medium in potash should be applied at least every 2 years.

CAPABILITY UNIT IIs-6

Deep, moderately coarse textured, lime-influenced soils on bottom lands make up this unit. These soils are level to gently sloping and occur along the Ohio and Kanawha Rivers, in most places fairly close and parallel to the rivers. The gently sloping areas are mostly long, narrow, rounded swells or ridges. They are subject to infrequent flooding, usually not more than once in 5 years. Floods generally do not limit the use of these soils, except in very narrow strips near the river that are flooded more than other areas. The soils of this unit have slow to medium runoff. They have medium to low moisture-holding capacity and are somewhat droughty to droughty. They are moderately productive and slightly to medium acid.

Soils in this unit are:

Ashton fine sandy loam, 0 to 3 percent slopes.
Ashton fine sandy loam, 3 to 8 percent slopes.
Huntington fine sandy loam, 0 to 5 percent slopes.

About 700 acres of these soils occur in Jackson and Mason Counties. Most tracts are small. These soils are suited to all locally grown crops and to long-term hay and pasture.

Tilled crops.—Corn, potatoes, soybeans, and various truck crops can be grown on these soils. In dry years lack of moisture limits growth. These soils are frequently farmed with a larger unit of level Huntington silt loam or Ashton silt loam soils. Continuous corn followed by a winter cover crop may be grown. Occasional longer rotations that include 1 or more years of hay will help maintain organic matter. Fertilizer containing phosphate and potash should be applied in amounts determined by soil tests. A pH of 6.5 to 7.0 should be maintained by liming. These soils may need herbicide treatment to control johnsongrass and quackgrass.

Long-term hay.—These soils are reasonably good for alfalfa-grass mixtures. Droughts injure deep-rooted legumes less than shallow-rooted legumes and grasses. Fertilizer high in phosphate and potash, used as a topdressing annually, insures good yields and stands that last longer. A pH of 6.5 to 7.9 should be maintained by liming.

Pasture.—The use of these soils for permanent pasture is now very limited. Some dairy farmers may need tall-grass pasture. Treatment and management are about the same as for long-term hay. Ladino clover, however, should be added to the alfalfa-grass mixtures.

Droughts injure bluegrass pasture on these soils. Tall-fescue mixtures for pasture or feedlots may be needed. Fertilizer should be applied in amounts determined by soil tests. Bluegrass pastures need phosphate fertilizer every 4 years. A pH of 6.0 to 6.5 should be maintained by liming.

CAPABILITY UNIT IIIe-4

This unit consists of deep, medium-textured, well-drained soils on wind- and water-deposited materials. They are strongly sloping and have medium runoff and medium moisture-holding capacity. The risk of erosion is moderate if the soils are not protected.

Soils in this unit are:

Duncannon silt loam, 8 to 15 percent slopes.
Holston silt loam, 8 to 15 percent slopes.
Wheeling silt loam, 8 to 15 percent slopes.

Wheeling silt loam, 8 to 15 percent slopes, occurs largely on long, narrow areas between terrace levels along the Ohio River. Duncannon silt loam, 8 to 15 percent slopes, is on areas adjacent to the uplands, generally east of the Ohio River. Holston silt loam, 8 to 15 percent slopes, occurs on high terraces or flats, locally known as the Upper Flats, above the Ohio and Kanawha Rivers.

About 3,000 acres of these soils occur in Jackson and Mason Counties. Almost all of the acreage has been cleared and farmed. About 80 percent is now in crops and pasture. Some areas are being used for urban and industrial sites. The soils in this unit are moderately productive and are suited to crops if intensive conservation measures are used. They are well suited to hay and pasture.

Crops.—These soils need rotations that include at least 2 years of hay in 4. Excess runoff can be controlled by stripcropping, contour cultivation, and other conservation practices. Intercepting diversion terraces are needed, especially on the Duncannon soil, to cut off water from upper slopes. Alfalfa mixtures are suitable for this soil. Cover crops should be used on areas that are bare over winter. A pH of 6.5 to 7.0 should be maintained by liming. Fertilizer should be applied in amounts determined by soil tests. Legume mixtures need an annual topdressing of a fertilizer that is high in phosphate and potash. Small, local, eroded or steep areas need such extra care as mulching, seeding, and fertilizing.

Long-term hay.—These soils are well suited to good legume mixtures. Alfalfa-grass mixtures control runoff well but should be seeded in contour strips. Intercepting diversion terraces are needed in places to divert hill water. Fertilizer that is high in phosphate and potash should be applied annually in amounts determined by soil tests. A pH of 6.5 to 7.0 should be maintained by liming. Alfalfa should not be sown late in fall.

Pasture.—Tall grass furnishes more forage than bluegrass. Tall-grass pastures are important to many farmers, especially dairy farmers. The same legume-grass mixtures suitable for hay may be grown on them, but ladino clover should be added to insure better grazing. Liming, fertilizing, and conservation measures are the same as for long-term hay. The success of tall-grass pastures depends on careful grazing. Rotational grazing and removing stock in time to let the pasture recover are important.

Permanent pastures of bluegrass and whiteclover are grown extensively on these soils. These pastures require a pH of 6.0 to 6.5, which should be maintained by liming. These soils should be topdressed every 2 years with a fertilizer that is high in phosphate and medium in potash. Early grazing may be obtained by treating the pasture with nitrogen very early in spring. Provisions for adequate water are important. Pastures should be properly stocked, and grazing should be delayed in spring until after the vegetation gets a good start. Small, eroded spots, steep banks, and other critical areas need such extra care as mulching, seeding, fertilizing, and temporary fencing.

CAPABILITY UNIT IIIe-6

This unit consists of deep, well-drained, strongly sloping soils on bottom land and alluvial fans at the base of hills. Runoff is medium, and the risk of erosion is moderate if these soils are not protected. Natural productivity is high, and the moisture-holding capacity is medium to high.

Soils in this capability unit are:

Ashton silt loam, 8 to 15 percent slopes.
Moshannon silt loam, 8 to 15 percent slopes.

The Ashton soil in this unit occurs mostly on long, narrow slopes between two levels of bottom land. Only the highest floodwaters cover it, and flooding is not a serious limitation. The Moshannon soil occurs on narrow slopes between level areas, but it is also on fans where small streams enter larger ones. Areas of the Moshannon soil on fans contain more small stones, are coarser textured, and receive more surface water than the Ashton soil in this unit.

These soils have a total area of about 800 acres in Jackson and Mason Counties. They occur mainly in small areas, especially the Moshannon soil. They have all been cleared and are now used mainly for crops or pasture. They occur in many places with more level soils.

Crops.—Suitable for these soils are 4-year rotations that include 2 years of hay. A typical rotation on these soils is corn, wheat, and 2 years, or more, of hay. The hay crops need an annual topdressing with a fertilizer that is high in phosphate and medium in potash. Cover crops are needed on bare areas during winter. Contour cultivation or trashy mulch should be used to prevent runoff. An occasional intercepting diversion terrace is needed in places, especially on the Moshannon soil, to divert runoff. Waterways should be kept in sod. A pH of 6.5 to 7.0 should be maintained by liming.

Long-term hay.—Alfalfa-grass mixtures do well on these soils. Fertilizer should be applied in amounts determined by soil tests when the hay is seeded. Trashy-mulch or contour cultivation should be used on these soils when they are reseeded. An annual topdressing with fertilizer that is high in phosphate and potash will increase the vigor and growth of hay on these soils. A pH of 6.5 to 7.0 should be maintained by liming.

Pasture.—Long-term hay that consists of alfalfa-grass mixtures and ladino clover may be used on these soils. Another successful mixture is ladino clover and orchardgrass. Lime and fertilizer requirements are similar to those for long-term hay.

Permanent bluegrass pasture does well on these soils and controls runoff and soil washing. Such pasture is especially well suited to the Moshannon soil. A topdressing of phosphate fertilizer is needed every 4 years. A pH of 6.0 to 6.5 should be maintained by liming. Pastures need mowing and grazing control. Water should be provided for grazing animals.

CAPABILITY UNIT IIIe-10

Only one soil is in this unit. It is a shallow to moderately deep, medium-textured soil on uplands. It has developed from gray, acid sandstone and shale. It is moderately productive but may be slightly droughty because of its lack of depth. Runoff is medium to rapid, and the risk of erosion is high if the soil is not protected.

The soil in this capability unit is:

Muskingum silt loam, 10 to 20 percent slopes.

The soil in this unit has a total acreage of about 600 acres, most of which is in Mason County. Individual areas are usually small and are frequently in a field with the more extensive Upshur-Muskingum soils. This soil is suitable for crops if proper rotations and conservation measures are used. It is also suitable for hay and pasture.

Crops.—Rotations that include at least 2 years of hay in 4 are needed on this soil. Stripcropping, contour farming, and diversion terraces on long slopes are needed to control erosion. Small, eroded spots should be mulched and seeded. Fertilizer that is high in phosphate and medium in potash should be used in amounts determined by soil tests. Enough lime should be applied to this naturally strongly acid soil to bring the pH to 6.5 to 7.0.

Long-term hay.—Alfalfa-grass mixtures are reasonably well suited to this soil. A pH of 6.5 to 7.0 should be maintained by liming. Fertilizer that is high in phosphate and medium in potash should be applied in amounts determined by soil tests, and an annual topdressing should be used. Careful mowing management will increase the life of stands. Mowing late in fall should be avoided.

Permanent pasture.—Tall-grass pasture can be expected to yield more forage on this soil than bluegrass pasture. Lime and fertilizer needs are the same for permanent pasture as for long-term hay. Grazing should be regulated, and stock should be kept off very wet soil.

CAPABILITY UNIT IIIe-11

One soil is in this unit. It is shallow to moderately deep, strongly sloping soil on uplands, mainly on the upper slopes and rounded ridges. It occurs only in the extreme northeast third of Jackson County. This soil was weathered from interbedded limestone, shale, and sandstone. Limestone ledges outcrop in some places. The subsoil is influenced by lime. Productivity is medium. Runoff is medium to high. The erosion hazard is moderate; some spots and shoulders of ridges are severely eroded.

The soil in this unit is:

Westmoreland silt loam, 10 to 20 percent slopes.

The soil in this unit has an area of less than 200 acres. All crops grown locally are suited. Runoff is a serious problem on tilled land. This is a good soil for long-term hay, and it produces very good bluegrass pasture. It occurs on the highest, coolest slopes in Jackson County.

Crops.—If this soil is stripcropped to control runoff and erosion, corn and other tilled crops can be grown. Rotations of at least 2 years of hay in 4 are suitable. Cover crops should be used if oats are grown. Alfalfa-grass mixtures make good hay crops on these soils. Fertilizer needs should be determined by soil tests. A pH of 6.5 to 7.0 should be maintained by liming.

Long-term hay.—This soil is well suited to alfalfa-grass mixtures. Seeding in contour strips helps control runoff and erosion. Hay should be fertilized at time of seeding in amounts determined by soil tests and topdressed annually with a fertilizer that is high in phosphate and medium in potash. Small, eroded spots need mulch and extra fertilizer. Water should be diverted from actively eroding spots. A pH of 6.5 to 7.0 should be maintained by liming. Mowing of alfalfa very late in fall should be avoided.

Pasture.—Under good management, tall-grass pastures yield well and the stands last reasonably long. Alfalfa-grass mixtures to which ladino clover has been added are suitable for pasture. Fertilizer requirements are the same as for long-term hay.

Bluegrass produces excellent sod on this soil. Many areas of tall-grass pastures and meadows are invaded by bluegrass and become permanent bluegrass pastures. This soil, although influenced by lime, should be tested and, where necessary, limed to a pH of 6.0 to 6.5. It needs phosphate fertilizer at least every 4 years. Vegetation on this soil becomes green very early in spring. Grazing should be deferred until the grass is at least 4 inches high and the ground is firm. Ponds may be built on this soil. Some landslips occur.

CAPABILITY UNIT IIIe-12

Only one soil is in this unit. It is a shallow to moderately deep soil that has developed from sandstone. It occurs in small areas on uplands, mostly in Mason County south of the Kanawha River. Some areas are on benches or strongly sloping ridges. A few sandstone outcrops occur. This soil has a medium to low moisture-holding capacity and is droughty. Runoff is medium. The supply of phosphate and potash is low. The soil is strongly acid.

The soil in this capability unit is:

Muskingum sandy loam, 10 to 20 percent slopes.

This soil has a total area of about 350 acres. It is suitable for crops if proper rotations and conservation practices are used. It can also be used for long-term hay and pasture.

Crops.—A good rotation that is commonly used on this soil consists of a row crop, grain, and 2 years of hay. Contour farming is needed on short slopes, and stripcropping and possibly diversion terraces are needed on long slopes. Winter cover crops will reduce erosion and help maintain organic matter. A fertilizer containing phosphate and potash is needed at time of seeding. An annual topdressing with a fertilizer that is high in both these nutrients is desirable. Amounts needed should be determined by soil tests. Most areas need liming. A pH of 6.5 to 7.0 should be maintained.

Long-term hay.—Alfalfa-grass mixtures produce satisfactory meadows of long-term hay on this soil. Reseeding should be by the trashy-mulch method or by contour cultivation. A fertilizer containing phosphate and potash is needed at time of seeding. Fertilizer high in both these nutrients is desirable for annual topdressing. A pH of 6.5 to 7.0 should be maintained by liming. This is not a strong alfalfa soil, but the life of the stand is lengthened if late mowing is avoided.

Pasture.—Tall-grass pastures are satisfactory on this soil. Alfalfa-grass mixtures may be used for pasture, and they have the same lime and fertilizer requirements as long-term hay. Mixtures of tall fescue or orchardgrass with ladino clover may be used. Tall-grass pasture on this soil commonly reverts to bluegrass pasture if very careful management is not practiced.

Bluegrass pastures hold fairly well, although the soil is somewhat droughty. Liming is usually necessary. A pH of 6.0 to 6.5 should be maintained. Fertilizer containing phosphate and potash should be applied every second year.

CAPABILITY UNIT IIIe-13

This unit consists of deep, strongly sloping, moderately well drained soils on terraces. These soils are mostly on the Upper Flats, along the Kanawha River in Mason County and along the medium-sized streams in both counties. In many places they occur in narrow strips and at the base of slopes. Runoff is high to medium. A few small gullies or rills occur in places. These soils, especially the Monongahela, receive considerable water from hilly areas. They are leached and low in plant nutrients, especially potash. Alfalfa may respond to boron.

Soils in this unit are:

Monongahela silt loam, 6 to 12 percent slopes.
Zoar silt loam, 6 to 12 percent slopes.

The Monongahela soil has a dense, brittle layer in the subsoil, and the Zoar soil has a heavy clay subsoil. These characteristics limit water penetration and partly restrict root penetration.

There are about 900 acres in this unit. The soils may be planted to corn and other tilled crops if conservation practices are carefully used. Long-term hay and permanent pasture are suitable.

Long-term hay.—Alfalfa-grass mixtures do only fairly well on these soils. Some winter damage occurs. These naturally strongly acid soils should be limed to a pH of 6.5 to 7.0. They are low in plant nutrients and need fertilizers that are high in phosphate and potash to produce good growth and lasting stands. Alsike clover, ladino clover, or some other water-tolerant legumes may be used. If very late cutting in fall is avoided, alfalfa stands last longer and have increased yields.

Pasture.—Mixtures of orchardgrass with ladino clover do well on these soils. Lime and fertilizer requirements are the same as for long-term hay. Stock should be kept off very wet soil.

Bluegrass pasture controls runoff well on these slopes. A pH of 6.0 to 6.5 should be maintained on these pastures by liming. A fertilizer that is high in phosphate and medium in potash should be used as topdressing every 2 years. Some areas need diversion terraces and other measures to control water. Small, eroded spots and small gullies need mulching, fertilizing, and seeding. Grazing should be controlled, and stock should be kept off very wet soil.

CAPABILITY UNIT IIIe-14

One soil is in this unit. The surface soil is naturally acid, but the underlying material is alkaline or limy. This soil is deep and moderately well drained and has a clayey subsoil. It developed on slack-water deposits that occur as benches above medium and large streams. Slopes are cut by small, rounded drainageways and have a distinctive appearance. The subsoil, when exposed, has a gray color that is easily recognized. The permeability of the subsoil is slow or very slow. Runoff and the risk of erosion are always problems. Root penetration is somewhat retarded.

The soil in this unit is:

Markland silt loam, 6 to 12 percent slopes.

The total area of this soil is slightly over 1,000 acres. Most of the acreage is in permanent pasture. This soil is suited to corn and other local crops. It is also suited to long-term hay. This is a very good soil for bluegrass pasture.

Crops.—Corn and small grain grow well on this soil. Rotations that include 2 years of hay in 4 are suitable. Winter cover is especially important on this erodible soil. All crops should be fertilized in amounts determined by soil tests. The surface soil is strongly acid in many places and should be tested and limed to a pH of 6.5 to 7.0 where necessary. This soil needs careful conservation practices if it is to be used for tilled crops. Contour stripcropping will help reduce runoff. Some seep spots need tile drainage. Waterways should always be kept in sod.

Long-term hay.—This soil, which has a lime-influenced subsoil, grows alfalfa well. There is some danger of winter damage, especially on concave slopes where runoff is slow. Alfalfa-grass mixtures should be fertilized in amounts determined by soil tests, topdressed annually, and managed to produce good yields and lasting stands.

Pasture.—Tall-grass pasture grows well but requires careful management. Grazing control and mowing are essential. Grazing very early in spring should be avoided. Fertilizer requirements and seed mixtures for pasture are the same as for long-term hay. Ladino clover may be used in the mixtures. Mixtures of orchardgrass with ladino clover are also suitable for tall-grass pasture.

Bluegrass does well on this soil. Tall-grass pasture is usually invaded by bluegrass and becomes permanent bluegrass pasture. A topdressing with phosphate at least every 4 years is needed. The soil should be tested, and a pH of 6.0 to 6.5 should be maintained by liming if necessary. Proper stocking and control of grazing are both needed. Ponds to supply water to stock are usually successful on this soil. They are needed to help distribute grazing.

CAPABILITY UNIT IIIe-15

This capability unit consists of red and gray, moderately deep soils on benches and slopes and deep soils at the bottom of slopes. The erosion hazard is mostly moderate, but there are some severely eroded areas. They have medium-textured surface soils and medium- to fine-textured subsoils. These are erodible soils. They are gently to strongly sloping. Runoff is moderate to rapid. Moisture-holding capacity is medium to high. These soils have acid surface soils and medium to strongly acid subsoils.

Soils in this capability unit are:

Muskingum-Upshur silt loams, 3 to 10 percent slopes, severely eroded.
Muskingum-Upshur silt loams, 10 to 20 percent slopes.
Vandalia silt loam, 8 to 15 percent slopes.

The total area of these soils is about 8,600 acres; over three-fourths of the acreage is in Mason County. These soils have been extensively farmed, and at one time nearly all areas were cleared. Pasture and cropland are extensive. About 3,000 acres are in woodland. If conservation measures are used, these soils are suitable for crops, hay, and pasture.

Crops.—Corn, wheat, oats, and tobacco are grown on these soils. Rotations at least 4 years in length are needed, and longer rotations are desirable. Hay should be grown 2 of the 4 years. All crops should be fertilized in amounts determined by soil tests, and a pH of 6.5 to 7.0 should be maintained by liming. These soils need runoff control if they are used for tilled crops. They need contour stripcropping and diversion terraces in places. Winter cover crops are needed if spring grain is grown. Natural waterways should be kept in sod.

Long-term hay.—Water control is also important for long-term hay. Contour farming and reseeding by trashy-mulch methods are desirable. Long slopes may need diversion ditches. Alfalfa-grass mixtures are suited to these soils. Fertilizer requirements should be determined by soil tests. An annual topdressing is needed. Small, actively eroding spots should be mulched and given extra fertilizer. A pH of 6.5 and 7.0 should be maintained.

Pasture.—Poor permanent pastures cause much of the erosion on these soils. Tall-grass pastures made up of mixtures of alfalfa and grass or orchardgrass and ladino clover are suitable. Fertilizer and lime requirements are the same as for long-term hay. Careful stocking and rotational grazing are necessary.

Bluegrass pastures produce good sod on these soils. Good pasture sod must be maintained to prevent erosion. Adequate phosphate fertilizer is necessary. A pH of 6.0 to 7.0 should be maintained by liming. Eroded areas should be mulched and fertilized. Careful stocking is needed to prevent overgrazing and subsequent erosion.

Woodland.—About 3,000 acres of these soils are in woodland. Almost all of this acreage was cropped at one time. Stocking and species are poor in many places.

CAPABILITY UNIT IIIe-30

This unit consists of gently to strongly sloping, erodible, red clayey soils. They occur on slightly bench-shaped upper slopes and on steep benches. They also occur on foot slopes in the uplands underlain by red shale. Soils in this unit have moderately fine-textured, moderately acid surface soils and clayey subsoils that are slightly acid to limy. Runoff is rapid or very rapid on these soils. Permeability of the surface soil is moderately slow in many places, and that of the subsoil is slow. The risk of erosion is very high, and areas with moderate and with severe erosion are included in this unit. Landslips are on some areas.

Soils in this unit are:

Upshur clay loam, 3 to 10 percent slopes, severely eroded.
Upshur silty clay loam, 3 to 10 percent slopes.
Upshur silty clay loam, 10 to 20 percent slopes.
Vandalia silty clay loam, 3 to 8 percent slopes.
Vandalia silty clay loam, 8 to 15 percent slopes.

About 16,000 acres of these soils occur in the two counties; about three-fourths of this acreage is in Jackson County. This unit includes many of the best situated upland areas and is important to the agriculture in Jackson and Mason Counties. They may be used for all locally grown crops, but intensive erosion control practices must be used. Long-term hay, as well as permanent pasture, is well suited to these soils. Tillage is very difficult on these soils. They clod badly if plowed when wet and dry out slowly in spring.

Crops.—Long rotations, such as (a) corn, wheat, and 3 years of hay or (b) wheat and 3 years of hay, are needed on these soils. Runoff and erosion must be controlled if the soils are tilled intensively. Stripcropping, contour cultivation, and the use of diversion terraces to cut off water are all necessary. Field roads should be kept in sod and fertilized. Natural waterways should be fertilized, seeded, and kept in sod. Actively eroding areas require mulch, extra fertilizer, seeding, and diversion terraces. All crops should be fertilized in amounts determined by tests, and a pH of 6.5 to 7.0 should be maintained by liming.

Long-term hay.—Alfalfa-grass mixtures do well on these soils, but some winter heaving and damage may occur. Late mowing should be avoided so that alfalfa can store food in the roots before winter. All hay crops should be fertilized in amounts determined by tests. An annual topdressing with a fertilizer that is high in phosphate and medium in potash will improve yields and help prolong stands. A pH of 6.5 to 7.0 should be maintained by liming. Careful water control is needed on areas in long-term hay. Reseeding by trashy-mulch methods and contour cultivation will help control erosion. Bare spots and eroding areas should be mulched, given extra fertilizer, and seeded.

Pasture.—Tall-grass pastures consisting of alfalfa and grass or orchardgrass and ladino clover yield well on these soils. Fertilizer and lime requirements are the same as for long-term hay. Very careful grazing management is needed to maintain the stands. The pasture should not be grazed when the ground is very wet.

Bluegrass pasture does well on these soils, but the stand must be well maintained or erosion will result. Adequate topdressing with phosphate fertilizer at least every 4 years is needed. A pH of 6.0 to 6.5 should be maintained by liming. The pasture should be carefully stocked and not grazed very early in spring or very late in fall. Watering places should be placed so as to distribute grazing. Mowing is necessary to control weeds and brush. Actively eroding spots need mulch, extra fertilizer, seeding, and fencing. Field roads should be kept in sod.

CAPABILITY UNIT IIIw-1

This unit consists of nearly level, poorly drained soils on bottom lands and terraces along the Ohio River. Soils in the unit usually occur some distance from the river in rather narrow, shallow, swalelike areas. They have medium and moderately coarse textured surface soils that are readily permeable to water. They also have clayey subsoils that are slowly permeable. Runoff is slow or often ponded, and water is on the surface much of the time unless drained. Productivity is medium to high.

Soils in this unit are:

Chilo sandy loam, 0 to 3 percent slopes.
Ginat silt loam, 0 to 3 percent slopes.
Melvin silt loam, 0 to 3 percent slopes.

Melvin silt loam, 0 to 3 percent slopes, occurs along the Ohio and Kanawha Rivers. This is the only soil in this unit subject to flooding. Flooding, however, is infrequent and does not limit cultivation.

The total area of these soils is about 5,000 acres. Three-fourths of this acreage is in Mason County. These soils need drainage before they can be cropped. When drainage is established, these soils can be used for corn and all grains, as well as for hay and pasture. Drainage of these soils facilitates the working of adjacent, better drained soils.

Crops.—Drainage is usually necessary before these soils can be successfully tilled. Tile drainage is fairly successful, especially in Melvin silt loam, 0 to 3 percent slopes. In many places these soils need complete tile drainage systems, intercepting drains, and open drains for outlets. In some places open ditches are needed for long distances. Rotations with at least 2 years of hay will improve tilth and structure. These soils will puddle if plowed when too wet. Fertilizer for all crops should be added in amounts determined by soil tests, and lime should be used to maintain a pH of 6.5 to 7.0.

Long-term hay.—Much the same drainage is needed for hay crops as for tilled crops. Water-tolerant mixtures are needed, such as red clover and grass or reed canarygrass and ladino clover. Fertilizer requirements should be determined by tests. An annual topdressing with a fertilizer that is high in phosphate and medium in potash should be used. Lime needs should be determined by tests, and a pH of 6.5 to 7.0 should be maintained. Aftermath grazing, when the soil is soft, should be avoided.

Permanent pasture.—Tall-grass pasture requires about the same drainage as tilled land. Ladino clover and grass mixtures are suitable for tall-grass pasture. The stands cannot be maintained if the soils are grazed when too wet.

Bluegrass pastures do well on drained areas of these soils. Drainage requirements, however, may be somewhat less intensive than for tilled crops, and more open-ditch drains can be used. Open ditches can be maintained if they are seeded with tall fescue and adequately fertilized. Mowing to control weeds is beneficial. Stock should not be allowed to graze these pastures when the soil is very wet. A topdressing of phosphate fertilizer is needed. A pH of 6.0 to 6.5 should be maintained by liming.

CAPABILITY UNIT IIIw-5

This unit consists of somewhat wet, nearly level and gently sloping soils on terraces in both counties. These soils occur on sizable flats and in some slightly low places on flats. Some areas receive surface water from adjoining slopes. These soils have medium-textured surface soils and heavy, slowly permeable subsoils. They have medium to slow runoff.

Soils in this unit are:

Markland and McGary silt loams, 2 to 6 percent slopes.
Tyler silt loam, 0 to 2 percent slopes.
Tyler silt loam, 2 to 6 percent slopes.

The Tyler soils are acid throughout. Markland and McGary soils have lime-influenced subsoils.

This unit comprises over 2,000 acres, two-thirds of which is in Jackson County. All of the acreage has been cleared, and nearly all is in crops and pasture. Crops and hay common to these counties are grown. Permanent pasture is suited. These soils need drainage for good production.

Crops.—A 4-year rotation with 2 years of hay will maintain good tilth and production on these soils. Cover crops will protect the soil over winter. Fertilizer needs for all crops should be determined by tests. A pH of 6.5 to 7.0 should be maintained by liming.

Tile drainage does not effectively improve the internal drainage of these soils, and complete drainage systems are not usually recommended. Random tile drainage is effective for very wet spots or for cutting off hill seepage. Open ditches for outlets and for the interception of hill water are satisfactory.

Long-term hay.—Drainage requirements are about the same as for tilled crops. Alfalfa in mixtures with other legumes and grasses produces fairly well on these soils, but the alfalfa may be short lived. Mixtures of orchardgrass and ladino clover or alsike clover are also suitable. Alfalfa will store food in its roots and withstand winter damage better if it is not mowed late in fall. Fertilizer should be applied in amounts determined by soil tests. These soils need an annual topdressing with a fertilizer containing phosphate and potash. A pH of 6.5 to 7.0 should be maintained by liming. Drainage requirements for long-term hay are about the same as for tilled crops.

Pasture.—Tall-grass pastures can be maintained by careful management of grazing. Grazing should be deferred until the soil is firm. Rotation grazing and mowing are helpful. Tall fescue, orchardgrass, or reed canarygrass mixed with ladino clover is suitable for pastures.

Bluegrass pasture does well on these soils if seep spots are drained and water from adjacent hills is diverted by open ditches. Tall-grass pastures are often invaded by bluegrass and become permanent bluegrass pastures. Pastures need a topdressing of phosphate fertilizer every 4 years. Weeds can be controlled by mowing. Grazing is distributed if ponds are placed at intervals in the pasture to supply water for stock. A pH of 6.0 to 6.5 should be maintained by liming.

CAPABILITY UNIT IIIs-1

Soils in this unit are deep, sandy, nearly level, and gently and strongly sloping. They have developed from wind-deposited or water-deposited sandy material along the Ohio River. They are coarse textured throughout and are droughty. Water moves rapidly through these soils. The moisture-holding capacity is low to very low. These soils have moderate to low fertility and organic matter and are strongly acid.

Soils in this unit are:

Lakin loamy fine sand, 3 to 8 percent slopes.
Lakin loamy sand, 0 to 3 percent slopes.
Lakin loamy sand, 3 to 8 percent slopes.
Wheeling fine sandy loam, 8 to 15 percent slopes.

The total area of these soils is about 1,500 acres. Most of the acreage is in Mason County. Large areas of Lakin loamy sand occur in and just north of Point Pleasant. One of these areas is the site of an abandoned TNT plant. Wheeling fine sandy loam occurs mostly on narrow benches between two different levels.

Corn, small grains, potatoes, and other local crops are grown on these soils. Normally they are damaged by lack of water. Long-term hay is suited to this soil. These soils are too droughty to support good stands of bluegrass. Much of the acreage of this capability unit is being taken over for industrial and urban sites.

Crops.—A suitable rotation for the soils in this unit is corn, wheat, and 2 or more years of hay. Contour cultivation on the gently and strongly sloping areas and stripcropping on long slopes help control runoff and erosion. All crops should be fertilized in amounts determined by soil tests. An annual topdressing with a fertilizer that is high in phosphate and potash is needed on areas in hay. Lime needs of these naturally acid soils should be determined by tests. A pH of 6.5 to 7.0 should be maintained.

Long-term hay.—These soils are not well suited to hay, but they grow satisfactory hay crops if adequately fertilized. Deep-rooted plants like alfalfa utilize any water stored in these soils. Alfalfa-grass mixtures should be used and should be fertilized in amounts determined by soil tests. Annual fertilization or split applications of fertilizer after each mowing are needed. Occasional use of fertilizers that contain boron is recommended for alfalfa. Manure on these coarse-textured soils helps to increase the amount of organic matter and to improve the moisture-holding capacity. Enough lime should be applied to maintain a pH of 6.5 to 7.0.

Pasture.—Tall-grass mixtures similar to those used for long-term hay will provide grazing on these soils. Fertilizer and lime requirements are the same as for long-term hay. Grazing should be very carefully managed. Rotational grazing, careful control of stocking, and prevention of overgrazing are important.

Bluegrass does not do well on these droughty soils. A mixture of tall fescue or tall oatgrass with ladino clover is better suited. Sericea lespedeza is a drought-resistant legume and can be used in these mixtures. Mowing is needed to keep these plants succulent and palatable. A fertilizer containing phosphate and potash should be applied at least every 2 years on bluegrass and annually on the tall-grass mixtures. The amount of lime needed on these acid soils should be determined by tests. A pH of 6.0 to 6.5 should be maintained.

CAPABILITY UNIT IVe-1

This unit consists of strongly sloping to moderately steep, moderately fine textured soils on uplands and on foot slopes below these uplands. The soils of this unit occur on benches that have very narrow, steep areas between them. They occur throughout Jackson County and in the northeastern part of Mason County. These heavy soils take up water slowly and have rapid runoff. Erosion is a very serious hazard. Productivity is moderate. Most areas have medium acid surface soils and slightly acid to limy subsoils.

Soils in this unit are:

Brooke clay loam, 6 to 12 percent slopes, severely eroded.
Upshur clay loam, 10 to 20 percent slopes, severely eroded.
Upshur-Muskingum silty clay loams, 20 to 30 percent slopes.
Vandalia silty clay loam, 15 to 25 percent slopes.
Vandalia clay loam, 8 to 15 percent slopes, severely eroded.

Brooke clay loam, 6 to 12 percent slopes, severely eroded, was developed from limestone. Its total acreage is small.

There are about 47,000 acres in this capability unit. About two-thirds of the acreage is in Jackson County. Soils in this unit are suitable for row crops if grown in a long rotation and for long-term hay, pasture, and woods.

Crops and long-term hay.—Wheat and 3 or more years of hay is a good rotation on these soils. A rotation that includes a row crop only once in 5 or 6 years is also suitable. Intensive conservation practices should be used if row crops are grown. Contour farming (fig. 6), intercepting diversion terraces to cut off hill water, and other practices to control water are necessary. Alfalfa-grass mixtures grow well but are subject to some winter damage on these heavy soils. The fertilizer needs for crops and long-term hay should be determined by soil tests. An annual topdressing with a fertilizer that contains phosphate and potash improves the yields and helps prolong the stands of hay. Natural waterways should be kept in sod. A pH of 6.5 to 7.0 should be maintained by liming.

***Figure 6.*—Contour stripcropping on Upshur-Muskingum soils.**

Pasture.—Tall-grass pastures that consist of mixtures of alfalfa and grass, orchardgrass and ladino clover, or tall fescue and ladino clover provide good forage on these soils. Careful grazing management is needed. Rotation grazing, proper stocking, and prevention of grazing when the ground is soft and very wet are important. Lime and fertilizer practices are the same as for long-term hay.

Bluegrass does well on these soils but may be damaged by drought in summer. Good sod must be maintained or erosion will occur. Adequate phosphate fertilizer should be applied at least every 4 years. A pH of 6.0 to 6.5 should be maintained by liming. These soils are influenced by lime, but their surface soils are strongly acid in many places. Ponds, improved springs, and other water facilities are desirable to help distribute grazing. Grazing should be deferred in spring until grass is at least 4 inches tall and the ground is firm. Small, actively eroding spots should be sloped, mulched, fertilized, and seeded.

Woodland.—These soils have a fairly large acreage of woodland. Many areas of pasture have been allowed to grow up in woods. Because these areas are grazed, the stands are poor and the species mostly undesirable in many places.

CAPABILITY UNIT IVe-3

This unit consists of strongly sloping to moderately steep, mostly medium-textured soils developed on uplands, terraces, and wind-deposited areas. These soils are mainly moderately deep to deep. They occur on upper flats and ridges, upland slopes, and at the base of slopes. Most slopes are smooth. Runoff is medium in most places. The permeability of the surface soils and subsoils is mostly moderate. These soils have only moderate productivity. They have a low supply of potash in some areas. They are strongly acid throughout.

Soils in this unit are:

- Duncannon silt loam, 8 to 15 percent slopes, severely eroded.
- Duncannon silt loam, 15 to 25 percent slopes.
- Holston silt loam, 8 to 15 percent slopes, severely eroded.
- Holston silt loam, 15 to 25 percent slopes.
- Muskingum sandy loam, 20 to 30 percent slopes.
- Muskingum silt loam, 20 to 30 percent slopes.

These soils have a total area of about 2,600 acres. Two-thirds of the acreage is in Mason County. Individual areas are usually small. These soils are suitable for tilled crops if a rotation lasting 5 years or more is used. They are suitable for long-term hay when adequately fertilized. They are also suitable for pasture and woodland.

Crops and long-term hay.—Rotations that include wheat and 3 or more years of hay are desirable on these soils. A tilled crop may be grown once in a 5- or 6-year rotation. Erosion is a serious hazard on these soils. Special care in preventing excessive runoff and erosion is needed if row crops are grown. Stripcropping and contour cultivation should be used if row crops and small grain are grown. Reseeding should be by trashy-mulch methods. Diversion terraces to cut off hill water may be needed. Alfalfa is suited to these soils if they are adequately fertilized and well managed. Actively eroding spots should be mulched, given extra fertilizer, and seeded. An annual topdressing of fertilizer containing potash and phosphate is especially important to maintain alfalfa stands. These acid soils should be limed to a pH of 6.0 to 6.5.

Pasture.—Mixtures of tall grass and of alfalfa and grass produce good pastures on these soils. Other suitable mixtures are tall fescue and ladino clover or orchardgrass and ladino clover. Lime and fertilizer needs are similar to those for long-term hay. Pastures need mowing to control weeds. Grazing should be controlled.

Bluegrass sod can be maintained on these soils if fertilizer and lime requirements are met. They may be damaged in droughty months. A pH of 6.0 to 6.5 should be maintained by liming. New seedings should receive fertilizer in amounts determined by tests. Phosphate-potash fertilizer should be applied at least every 2 years. Eroded spots need mulch, extra fertilizer, and seeding.

CAPABILITY UNIT IVe–9

This unit consists of deep, severely eroded, moderately wet soils on terraces above the larger streams and rivers. They have medium-textured surface soils that let in water readily. The subsoils, however, are slowly permeable. They are heavy clay, or they have a dense, brittle layer at depths of about 20 to 24 inches. Thus, the water that enters the surface soils is stopped by the subsoils. The surface soils therefore become saturated, and runoff is rapid. Erosion is a greater problem on these soils than drainage. Up to three-fourths of the original surface soil has been removed by erosion, and a few gullies occur. These soils have moderate to low productivity. The supply of potash is low in many areas.

Soils in this unit are:

- Markland silty clay loam, 6 to 12 percent slopes, severely eroded.
- Markland and McGary silty clay loams, 2 to 6 percent slopes, severely eroded.
- Monongahela silt loam, 6 to 12 percent slopes, severely eroded.
- Zoar silt loam, 6 to 12 percent slopes, severely eroded.

These soils are acid throughout, with the exception of the Markland and McGary soils, which have acid surface soils but limy layers deep in the subsoils.

These soils have a total area in Jackson and Mason Counties of about 1,800 acres. They are suited to long-term hay, or to cultivated crops if grown 1 year in a 5- or 6-year rotation. Pasture and woodland are also suited. Areas in cultivated crops are subject to serious erosion. Such crops should be grown only when necessary for use in the farm economy.

Long-term hay.—A desirable rotation on these soils is one that includes small grain and 3 years of hay. Permanent hay is also desirable; the ground should be broken only to reseed. Stripcropping, contour cultivation, and trashy-mulch methods should be used when seeding. Alfalfa-grass stands will usually be short lived on these soils. Orchardgrass and ladino or alsike clover may also be used. Cutting of alfalfa late in fall should be avoided to allow the plants to store food in the roots. Fertilizer should be applied in amounts determined by soil tests. An annual topdressing with a fertilizer that is high in phosphate and potash is desirable. A pH of 6.5 to 7.0 should be maintained by liming. Active eroding spots need mulch, extra fertilizer, and seeding. Natural drainageways should be kept in sod. Intercepting drains may be needed to divert water from these soils. Seep spots may need tile drainage.

Pasture.—Tall grass provides good pasture on these soils. Alfalfa mixtures, and mixtures of orchardgrass or tall fescue with ladino clover may be grown. Lime and fertilizer needs, as well as conservation practices, are about the same as for long-term hay.

Bluegrass does moderately well on these soils. It must be fertilized in amounts determined by soil tests to maintain a good sod. A pH of 6.0 to 6.5 should be maintained by liming. Weeds, brush, and rank growth should be controlled by liming. Grazing should be delayed in spring until grass is about 4 inches high and the ground is firm. Construction of ponds and improvement of springs are feasible on these soils and will help distribute grazing on pastures.

Woodland.—Almost all of the acreage of these soils has been cleared. Some pastures have been allowed to revert to woods. Most of them have undesirable kinds of trees in poor stands.

CAPABILITY UNIT IVe–15

This unit consists of mostly moderately deep to deep, well-drained soils on uplands underlain by sandstone and red limy shale and soils on foot slopes below these uplands. These moderately steep soils have medium-textured, moderately permeable surface soils. They have moderately fine, clayey subsoils with moderately slow permeability. Runoff is moderate to rapid. Erosion has been severe on some of these soils. Productivity is moderate. These soils have acid surface soils and normally medium acid subsoils.

Soils in this unit are:

- Muskingum-Upshur silt loams, 10 to 20 percent slopes, severely eroded.
- Muskingum-Upshur silt loams, 20 to 30 percent slopes.
- Vandalia silt loam, 15 to 25 percent slopes.

The Vandalia soil in this unit receives considerable water from higher slopes. Occasional sandstone ledges occur in the Muskingum-Upshur soils. This unit comprises about 32,000 acres. About 28,000 acres are in Mason County. These are important soils on many small farms. They are suitable for occasional cultivation, long-term hay, pasture, and woodland.

Crops.—A suitable rotation for these soils is 1 year of wheat and 3 or more years of hay. Long-term hay is also desirable; the ground should be broken only for reseeding. Occasional tilled crops should be grown only 1 year in 5, or less often. Contour strips should be used for small grain and tilled crops. If spring grain is used, a cover crop is needed. Diversion terraces may be needed to remove water from gullies and from actively eroding spots. Actively eroding spots may need sloping, mulching, extra fertilizer, and seeding. Fertilizer should be applied in amounts determined by tests. An annual top-dressing with fertilizer high in phosphate and moderate in potash is needed. A pH of 6.5 to 7.0 should be maintained by liming.

Pasture.—Tall-grass pastures are suitable for these soils. Lime and fertilizer requirements are about the same as for long-term hay. Alfalfa mixtures and orchardgrass or tall fescue mixed with ladino clover may be grown. Grazing control is needed. Grazing should be delayed in spring until the ground is firm.

Bluegrass produces reasonably good sod on these soils, but it is damaged by drought in summer except on the soils on foot slopes. Careful grazing management is needed to maintain good bluegrass sod. Much active erosion occurs on overgrazed, poorly managed pastures. Fertilizer should be applied in amounts determined by soil tests. A pH of 6.0 to 6.5 should be maintained by liming. Grazing should be deferred in spring until the grass is about 4 inches high and the ground is firm. Grazing very late in fall is injurious to sod and promotes runoff. Pastures should be mowed to control weeds and brush. These soils generally furnish suitable sites for ponds to provide water for stock and to help distribute grazing.

Woodland.—Almost all of the acreage in this unit has been cleared at some time. Woods have been allowed to grow up on eroded and neglected pastures. The kinds of trees and the density of stands are usually unsatisfactory.

CAPABILITY UNIT IVw-1

This unit consists of nearly level, deep, poorly to very poorly drained soils with heavy clay subsoils. These soils are mainly along the Kanawha River, normally a good distance from the stream. They occur in low-lying or swalelike areas and are a common sight along the river side of Route No. 17. They have slow runoff because of their position, and they are often ponded. Areas that are not drained grow brush and sedges. These soils have acid surface soils and medium to slightly acid subsoils.

Soils in this unit are:

Melvin silty clay loam, 0 to 3 percent slopes.
Purdy silt loam, 0 to 4 percent slopes.

Melvin silty clay loam, 0 to 3 percent slopes, floods infrequently. Floodwaters do not scour this soil excessively, but water stands on some areas for long periods after floods.

The total area of these soils is slightly more than 1,600 acres; 1,500 acres are Melvin silty clay loam, 0 to 3 percent slopes. Drained areas are suitable for occasional tilled crops, long-term hay, and pasture.

Crops.—Drainage is the first requirement on these soils. Tile drainage is not generally successful because of the heavy subsoils. Open drainage is recommended to intercept hill water, to remove surface water, and to lower the water table. Because these soils occupy depressions, deep cuts may be necessary to provide outlets to the river. Maintenance of ditches is very important. They should be cleaned and the sides should be properly sloped, fertilized with a complete fertilizer, and seeded with tall fescue. Some tile drainage in local spots may be practical.

Tillage and the use of machinery tend to destroy the structure of these soils and to produce hard surfaces. Generally, a cropping system in which hay is grown a number of years and a tilled crop only occasionally is recommended for these soils. Soybeans or similar tilled crops may be used sparingly to produce the smooth surfaces needed to help surface drainage. Water-tolerant species such as orchardgrass, reed canarygrass, or tall fescue, mixed with ladino or alsike clover, are desirable on these soils. Fertilizer should be applied in amounts determined by soil tests. A pH of about 6.0 to 6.5 should be maintained by liming. Larger quantities of lime than justified may be needed to raise the pH of these soils above 6.5.

Pasture.—Pasture needs about the same drainage as long-term hay. Tall-grass pastures yield well, but they must not be grazed when the ground is wet and soft. Seed mixtures and lime and fertilizer requirements are similar to those needed for long-term hay.

Bluegrass sod does well on these soils if they are drained, fertilized, and limed to a pH of 6.0 to 6.5. Grazing should be deferred until the ground is firm and the grass is about 4 inches high. Grazing late in fall should be avoided. Stockwater ponds are usually successful on these soils. These ponds should be placed so as to distribute grazing animals.

Woodland.—Woodland is quite limited on these soils. Pin oak is one of the main species.

CAPABILITY UNIT IVs-1

Only one soil is in this unit. It is a deep, strongly sloping, very droughty soil developed in wind-deposited sands. Runoff is medium to slow. The surface soil and subsoil have rapid permeability. This soil is low in productivity, low in organic matter, and strongly acid throughout.

The soil in this unit is:

Lakin loamy fine sand, 8 to 15 percent slopes.

This soil has an area of slightly more than 500 acres, most of which is in Mason County. All of the acreage has been cleared and is in crops and pasture or is idle. This soil is suitable for long-term hay. A tilled crop may be grown in a crop rotation. This soil may also be used for permanent pasture, but it is poorly suited to bluegrass because of its droughtiness.

Crops and long-term hay.—A good rotation on this soil is 1 year of wheat and 3 or more years of hay. A tilled crop may be grown 1 year in a 5- or 6-year rotation. Alfalfa-grass mixtures are suitable for this soil. The deep-rooted alfalfa plant utilizes the little moisture stored in this droughty soil. Stripcropping on the longer slopes and contour cultivation should be used when reseeding. Fertilizer needs should be determined by soil tests. After each mowing, it is desirable to use split applications of a fertilizer that is high in potash, since nutrients leach quickly from this sandy soil. Fertilizer that contains boron may be needed for alfalfa-grass mixtures. A pH of 6.5 to 7.0 should be maintained by liming. The amount of lime needed should be determined by tests.

Pasture.—Mixtures suitable for long-term hay make good pastures on this soil. Lime and fertilizer requirements are about the same as for long-term hay. It is necessary to fertilize this soil regularly in order to maintain the stand.

Bluegrass sod does not do well on this soil. Sod grown from mixtures of tall fescue and sericea lespedeza may be used. Mowing is necessary to keep pastures more palatable to livestock. A topdressing with a fertilizer that contains phosphate and potash is needed at least every 2 years. A pH of 6.0 to 6.5 should be maintained by liming. Ponds to supply water to stock are difficult to contruct on this sandy soil. Lack of water may limit the usefulness of this soil for pasture.

CAPABILITY UNIT VIe–1

Soils in this unit include moderately steep and steep, lime-influenced red and gray soils of the uplands, heavy soils on limestone, and soils on foot slopes in the uplands underlain by red shale. These soils are moderately deep to deep. Most of them have lost much of their original surface soil through severe erosion. Both surface erosion and gully erosion are common. Landslips are also common (fig. 7). Runoff is rapid. The permeability of the surface soil is for the most part moderately slow, and that of the subsoil is slow. The moisture-holding capacity is medium to low.

Soils in this unit are:

Brooke clay loam, 12 to 25 percent slopes, severely eroded.
Markland silty clay loam, 12 to 25 percent slopes, severely eroded.
Upshur-Muskingum clay loams, 20 to 30 percent slopes, severely eroded.
Upshur-Muskingum silty clay loams, 30 to 40 percent slopes.
Vandalia clay loam, 15 to 25 percent slopes, severely eroded.
Vandalia silty clay loam, 15 to 25 percent slopes, severely eroded.
Vandalia silty clay loam, 25 to 35 percent slopes.
Westmoreland silt loam, 20 to 30 percent slopes, severely eroded.

This unit has more than 100,000 acres, mainly in Jackson County. These soils are either too steep or too badly eroded for tilled crops or permanent hay. They are suitable for pasture and woodland. The risk of erosion is very high on all of these soils.

Permanent pasture.—These soils are fairly good for pasture but are slightly droughty at times. Mixtures of tall fescue and ladino clover or orchardgrass and ladino clover may be sown on the smoother slopes. Much of the present erosion on these soils resulted from poorly maintained and overgrazed pastures. Good sod can be maintained on these soils only by careful pasture management. Trashy-mulch methods and contour strips should be used if possible when these soils are seeded. Fertilizer should be applied in amounts determined by soil tests.

Figure 7.—**Cleared and pastured area of Upshur-Muskingum soils in Jackson County showing landslip. Slopes range from 30 to 45 percent in this area.**

These soils produce fairly good bluegrass sod, although some of them are a little too droughty. Bluegrass pasture should be fertilized every 4 years with phosphate and limed to a pH of 6.0 to 6.5.

Pastures need ponds in suitable areas or improved springs to supply water and help distribute grazing. Mowing is needed to control weeds and brush. Grazing should be deferred until grass is about 4 inches high and the ground is firm. Careful stocking is necessary, as overgrazing is very detrimental to sod on these heavy soils. Actively eroding spots should be fenced, graded, mulched, fertilized, and seeded.

Woodland.—There are over 30,000 acres of woodland on these soils. Much of this acreage consists of pastures that have been allowed to go back to woods in the last decade. The steepest and most severely eroded areas in this unit are in woodland. Most of the tree species are undesirable, and the stands are poor, partly because of heavy grazing during the restocking period.

CAPABILITY UNIT VIe–2

This unit consists of moderately steep, moderately deep to deep soils on terraces, upland slopes, and areas of wind deposits. Erosion has removed about three-fourths of the original surface soil from these soils. Occasional small gullies occur. All soils in this unit are acid throughout.

Soils in this unit are:

Duncannon silt loam, 15 to 25 percent slopes, severely eroded.
Holston silt loam, 15 to 25 percent slopes, severely eroded.
Muskingum sandy loam, 20 to 30 percent slopes, severely eroded.
Muskingum silt loam, 20 to 30 percent slopes, severely eroded.
Zoar silt loam, 12 to 25 percent slopes, severely eroded.

All except Zoar silt loam, 12 to 25 percent slopes, severely eroded, are well drained, have medium texture, and have moderately permeable subsoils. The Zoar soil is moderately well drained and has a fine-textured subsoil.

The soils of this unit have a total acreage of about 1,200 acres. They are best suited to pasture and woodland. They are too steep and severely eroded for tilled crops.

Permanent pasture.—These soils may be seeded to permanent pasture if stripcropping, trashy-mulch cultivation, and other erosion control practices are used. Mixtures of tall fescue and ladino clover or orchardgrass and ladino clover may be used. They will revert to the bluegrass type of pastures. Fertilizer should be applied in amounts determined by soil tests.

Bluegrass sod can be maintained on these soils by proper fertilization, liming, and grazing control. Pastures should be topdressed with phosphate fertilizer every 4 years, and a pH of 6.0 to 6.5 should be maintained by liming. Small, severely eroded spots should receive extra fertilizer and should be seeded and mulched. Weeds and brush should be controlled by mowing. Grazing should be deferred in spring until the grass is at least 4 inches high and the ground is firm. Overgrazing pastures on these severely eroded soils promotes further erosion.

Woodland.—The total acreage of woodland in this unit is small.

CAPABILITY UNIT VIe-3

This unit consists of moderately steep to steep soils on uplands and on foot slopes in the uplands. More of these soils have developed from gray sandstone than from limy red shale. Most areas are moderately deep. However, some shallow and some deep areas occur. There are some sandstone ledges. The soils of this unit have medium-textured, acid surface soils and medium-textured to somewhat clayey subsoils. Runoff is rapid because of the steepness of the slope. Erosion has been severe on some of the soils in this unit, and the hazard of erosion is severe for all soils in the unit. Sheet and gully erosion and some landslips occur.

Soils in this unit are:

- Muskingum-Upshur silt loams, 20 to 30 percent slopes, severely eroded.
- Muskingum-Upshur silt loams, 30 to 40 percent slopes.
- Vandalia silt loam, 25 to 35 percent slopes.

These soils have a total area of about 52,000 acres, mostly in Mason County south of the Kanawha River. They are suited for pasture and woodland. They are either too steep or too steep and severely eroded for tilled crops. Pasture and woodland are suitable uses. The soils on uplands, however, may be somewhat droughty for pasture.

Permanent pasture.—The smoother areas of these soils may be seeded to permanent pasture. Contour strips and trashy-mulch methods should be used on long slopes. Mixtures of orchardgrass and ladino clover or tall fescue and ladino clover are suitable. These pastures are generally taken over by bluegrass. Bluegrass on the Muskingum-Upshur soils is injured somewhat by drought. Some of the worst erosion has occurred on poor bluegrass sod or overgrazed pastures.

Pastures, when reseeded, should be fertilized in amounts determined by soil tests. They should be topdressed with a phosphate fertilizer at least every 4 years. A pH of 6.0 to 6.5 must be maintained by liming in order to grow successful pastures. Weeds and brush should be controlled by mowing. Grazing should be deferred in spring until the grass is about 4 inches high and the ground is firm. It should be avoided late in fall when the ground is wet. Slopes on eroded and gullied spots should be graded, fertilized, seeded, mulched, and fenced. Water may have to be diverted from them.

Woodland.—About 15,000 acres of woodland occur on these soils. Much of this acreage was formerly neglected pasture, mainly on the more eroded and steeper areas. The stands are poor, and the kinds of trees are mostly undesirable in many places.

CAPABILITY UNIT VIs-1

Only one soil is in this unit. It is a deep, well-drained, very stony soil occurring at the foot of slopes below uplands underlain by sandstone and limy red shale. It has developed in accumulations from these uplands. Most areas are moderately steep. Considerable areas of this soil occur where the flats along the Ohio River join the uplands. This junction is often a steep, stony bluff. Stones break off from these bluffs and roll onto these areas. Boulders range from a few to 10 to 12 feet in size. This soil has a medium-textured surface soil and a fine-textured subsoil. It has a good moisture-holding capacity and medium runoff. The surface soil is medium acid in most places. There are some small seep spots and landslips on this soil.

The soil in this unit is:

- Vandalia very stony silt loam, 5 to 15 percent slopes.

The area of this soil is slightly more than 100 acres. This soil is well suited to pasture, but stones prevent its use for tilled crops and restrict the use of machinery.

Pasture.—Bluegrass grows well on this soil. A pH of 6.0 to 6.5 should be maintained by liming. Many farmers consider this soil worth the extra effort of applying lime and fertilizer. Phosphate fertilizer should be applied every 4 years. A pH of 6.0 to 6.5 should be maintained by liming. Mowing to control brush and weeds should be done where practical. Adequate stocking, but not overstocking, helps control rank grass and weeds. Eroded spots need mulch, fertilizer, and seeding. Landslips may need to be fenced.

Woodland.—The woodland acreage is small on this unit. Most of the woods have grown up from neglected pasture.

CAPABILITY UNIT VIIe-1

This is a very large unit containing almost a third of the acreage of Jackson and Mason Counties. It includes lime-influenced soils on uplands underlain by limy red shale, as well as soils on the foot slopes of these uplands. The soils range from strongly sloping to very steep and are mostly shallow to moderately deep. A few sandstone ledges occur. Many streams drain the uplands on which these soils occur, and there are many convex slopes. Many of these soils have been severely or very severely eroded. These soils have a fair moisture-supplying capacity. The foot slopes, however, supply adequate moisture. The surface soils are acid.

Soils in this unit are:

- Muskingum-Upshur silt loams, 30 to 40 percent slopes, severely eroded.
- Muskingum-Upshur silt loams, 40 to 55 percent slopes.
- Muskingum-Upshur silt loams, 40 to 55 percent slopes, severely eroded.

Upshur clay loam, 10 to 20 percent slopes, very severely eroded.
Upshur-Muskingum clay loams, 20 to 30 percent slopes, very severely eroded.
Upshur-Muskingum clay loams, 30 to 40 percent slopes, severely eroded.
Upshur-Muskingum clay loams, 40 to 55 percent slopes, severely eroded.
Upshur-Muskingum silty clay loams, 40 to 55 percent slopes.
Vandalia clay loam, 25 to 35 percent slopes, severely eroded.
Vandalia clay loam, 15 to 35 percent slopes, very severely eroded.
Westmoreland silt loam, 30 to 40 percent slopes, severely eroded.
Westmoreland silt loam, 40 to 55 percent slopes, severely eroded.

About 160,000 acres occur in this unit. These soils occur throughout Jackson and Mason Counties. They are best suited to woods. They are too steep, too badly eroded, or too steep and stony for crops or pasture.

Woodland.—Much of the acreage of these soils has never been cleared (fig. 8). About 60,000 acres, however, have been cleared and are largely in pasture. Many of the cleared areas are being allowed to grow up in woods. Stands and kinds of trees on these areas are generally poor. Good stands of Virginia pine, however, have volunteered in some places. Pastures are not suitable on these soils, except on very limited areas of benches that are smoother and less steep than elsewhere.

CAPABILITY UNIT VIIe-2

This unit consists of steep and very steep soils on uplands and on wind-deposited areas. They are strongly acid and shallow to moderately deep. Some are severely eroded. The original surface soil has been eroded, and some gullies have formed. These soils are moderately permeable and have medium moisture-holding capacity. Runoff is rapid because of the steepness of the slopes. The risk of erosion on all of the soils in this unit is high. Sandstone ledges occur in places.

Figure 8.—**Oak woodland on Upshur-Muskingum soils.**

Soils in this unit are:

Duncannon silt loam, 25 to 40 percent slopes.
Duncannon silt loam, 25 to 40 percent slopes, severely eroded.
Muskingum sandy loam, 30 to 55 percent slopes.
Muskingum sandy loam, 30 to 55 percent slopes, severely eroded.
Muskingum silt loam, 30 to 40 percent slopes.

The Muskingum soils in this unit are somewhat droughty.

The area of these soils is about 2,400 acres. Individual areas are usually small. Over half of the acreage of these soils has been cleared, and most of this acreage is still in poor pasture. These soils are best suited to woods.

Woodland.—Some of these soils have never been cleared. Most cleared areas were in pastures. The pastures, however, have been allowed to revert to woods. The stands are poor and the kinds of trees are generally undesirable, but there are some good stands of Virginia pine.

CAPABILITY UNIT VIIe-3

This unit consists of moderately steep, steep, and very steep soils with very severe erosion. Erosion has removed most or all of the surface soil. Numerous and deep gullies occur in some areas. Landslips also occur. These are moderately deep, mixed red and yellowish-brown soils from limy red shale and sandstone. Runoff is rapid. Organic matter has been washed away with the surface soil. The temperature of the surface soil is high in summer, and the soils are often difficult to revegetate. They are moderately productive and are moderately acid in the subsoil.

Soils in this unit are:

Muskingum-Upshur silt loams, 10 to 20 percent slopes, very severely eroded.
Upshur-Muskingum clay loams, 30 to 40 percent slopes, very severely eroded.
Upshur-Muskingum clay loams, 40 to 55 percent slopes, very severely eroded.

These soils have a total area of about 6,000 acres. They normally occur in small or very small areas. Many of these areas are where water from natural draws or higher slopes concentrates. They are largely problem, or critical, areas. These soils are suitable only for woodland and wildlife food and cover.

Treatment of critical areas.—Many areas of these soils occur in pastures or meadows. They should be stabilized with grass, with tall fescue and sericea lespedeza, or with trees and shrubs. If grasses and legumes are grown, the areas should be mulched, seeded, and given twice the normal amount of fertilizer. The sides of gullies should be sloped. Diversion of water and protection from livestock by fencing are often the first requirements.

Woodland.—Most of these soils have been cleared. Excess tillage or poor pasture management has caused very severe erosion. Some neglected pastures on these soils have grown up in woods. Tree species are mostly undesirable, and stands are usually poor. Some excellent Virginia pine stands occur. Planting suitable species is very important, because many of these areas are not reseeding fast enough to provide stabilization.

CAPABILITY UNIT VIIs-1

This unit consists of steep and very steep, very stony soils. These soils have developed on upland slopes, mostly from gray, acid sandstone. Some of the soils have developed from red clay shale. Loose sandstones and sandstone ledges occur. Slopes are bench shaped and irregular.

Soils in this unit are:

Muskingum-Upshur very stony loams, 30 to 40 percent slopes.
Muskingum-Upshur very stony loams, 40 to 55 percent slopes.
Muskingum-Upshur very stony loams, 30 to 55 percent slopes, severely eroded.
Vandalia very stony silt loam, 15 to 35 percent slopes.

A small acreage of Vandalia very stony silt loam occurs on foot slopes.

The total area of the soils in this capability unit is about 41,000 acres. Most of the acreage is in woods, but a considerable number of poor pastures are still maintained.

Woodland.—Pasture is not suitable, except on very small areas that are relatively free of stones and smoother than usual for these soils. Much of the acreage has never been cleared, and some is in good woodland.

CAPABILITY UNIT VIIs-2

This unit consists of moderately steep to steep, sandy soils on wind-deposited areas. They are deep and droughty or very droughty. Permeability is rapid and runoff is usually medium. Small areas have lost as much as three-fourths of the original surface soil through erosion.

Soils in this unit are:

Lakin loamy fine sand, 15 to 25 percent slopes.
Lakin loamy fine sand, 25 to 40 percent slopes.
Lakin loamy fine sand, 25 to 40 percent slopes, severely eroded.

These soils have a total area of about 500 acres. They occur on dunelike areas and lower slopes on the extreme east side of the Ohio River bottoms.

Woodland.—Most of these soils have been cleared at some time and used for pasture. They are too droughty and too steep for successful production of crops or pasture. They are also too droughty for best tree growth but can grow many of the local hardwoods.

Estimated Yields Under Two Levels of Management[1]

The estimated yields for the three major crops grown on the soils of Jackson and Mason Counties are shown in table 2. Yields are estimated for two levels of management and shown under columns A and B. Those in columns A are estimated for the common management now being used by farmers. Those in columns B are estimated for the best management feasible on the soils.

Known crop yields, where available from farmers or others, were used to estimate the yields in columns A. Average yields were calculated from the United States census data for 1954 for Jackson and Mason Counties. The average yields for corn and alfalfa-grass mixtures calculated from census figures were about the same as average yields of those crops on Lindside silt loam, 0 to 3 percent slopes. The average yields for the other soils in the two counties were based on these yields.

Present yields are about what the average farmer obtains over an average 10-year period with commonly used practices. Many of the present yields on many of the soils of Jackson and Mason Counties are well above the State average. Present management, especially on the Ohio and Kanawha River bottoms, is considerably higher than the State average.

The estimated yields in columns B are based on the following: (1) Experimental results secured on the Wheeling and other soils from the Ohio Valley Substation (Point Pleasant) in Mason County, and (2) actual experience by farmers using the best management. These yields represent about the maximum that can be expected over a 10-year period from management based on present knowledge and methods that can be practically used. Management needed to obtain these yields includes liming to the pH required for the crop, fertilizing according to needs determined by soil tests, use of good rotations, and use of the necessary erosion control measures. As a rule, manure is not used extensively. Management needed to obtain the yields estimated for pasture includes use of enough fertilizer to provide phosphate and potash where needed and enough lime to maintain a pH of 6.0 to 6.5.

Yields for soils for which yield data were not available were estimated. The properties of these soils and local knowledge and experience were considered in making these estimates.

Woodlands[2]

According to the 1954 Federal census, 2,654 farms reported 134,687 acres in woodland, or about 23 percent of the total farm area of Jackson and Mason Counties. Practically all of the woodland is in small acreages as part of farms. However, about 12,400 acres in Mason County are owned by the State and are mostly in woodland. No woodland is owned by the Federal Government.

Woodlands are generally distributed throughout the two counties and for the most part are on the Upshur-Muskingum and Muskingum-Upshur soil complexes and on associated soils. They are mostly on the southern and western exposures of the steepest land in the two counties.

The woodlands (especially those that are parts of farms) are in poor condition. Continuous grazing, heavy cutting, and fires have depleted the growing stock. Culls and low-value species make up a large part of the best sites.

The amount of income received from sale of wood products by farmers in the counties is evidence of the poor condition of the growing stock. According to the 1954 Federal census, 3,399 farms reported receiving

[1] DR. G. G. POHLMAN, head of Agronomy and Genetics Department, Agricultural Experiment Station, West Virginia University, assisted with the preparation of this section.

[2] ROSS H. MELLINGER, woodland conservationist, Soil Conservation Service, assisted in the preparation of this section.

TABLE 2.—*Estimated average acre yields of the major crops under two levels of management*

[Average acre yields for Jackson and Mason Counties calculated from U.S. Census of Agriculture figures for 1954: Corn, 54 bu., alfalfa-grass, 2 tons. Absence of yield estimate indicates that the crop is not suited to the soil]

Soil symbol	Soil	Corn		Alfalfa-grass		Permanent pasture	
		A	B	A	B	A	B
		Bu.	*Bu.*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
AfA	Ashton fine sandy loam, 0 to 3 percent slopes	70	105	2. 5	4. 0	80	160
AfB	Ashton fine sandy loam, 3 to 8 percent slopes	65	100	2. 3	3. 7	75	150
AsA	Ashton silt loam, 0 to 3 percent slopes	75	110	3. 0	4. 3	100	200
AsB	Ashton silt loam, 3 to 8 percent slopes	70	105	3. 0	4. 3	100	200
AsC	Ashton silt loam, 8 to 15 percent slopes	65	95	2. 7	4. 0	90	180
BcC3	Brooke clay loam, 6 to 12 percent slopes, severely eroded			2. 0	3. 5	80	140
BcD3	Brooke clay loam, 12 to 25 percent slopes, severely eroded					75	135
ChA	Chilo sandy loam, 0 to 3 percent slopes	30	70			65	135
DuB	Duncannon silt loam, 3 to 8 percent slopes	60	95	2. 5	4. 0	65	155
DuC	Duncannon silt loam, 8 to 15 percent slopes	55	90	2. 4	3. 7	60	150
DuC3	Duncannon silt loam, 8 to 15 percent slopes, severely eroded	50	85	2. 2	3. 4	57	145
DuD	Duncannon silt loam, 15 to 25 percent slopes	50	85	2. 0	3. 1	55	140
DuD3	Duncannon silt loam, 15 to 25 percent slopes, severely eroded			1. 8	2. 8	50	135
DuE	Duncannon silt loam, 25 to 40 percent slopes						
DuE3	Duncannon silt loam, 25 to 40 percent slopes, severely eroded						
GsA	Ginat silt loam, 0 to 3 percent slopes	35	75			70	125
HaA	Hackers silt loam, 0 to 3 percent slopes	75	110	3. 0	4. 3	100	200
HaB	Hackers silt loam, 3 to 8 percent slopes	70	105	3. 0	4. 3	100	200
HoC	Holston silt loam, 8 to 15 percent slopes	40	80	1. 6	3. 3	60	150
HoC3	Holston silt loam, 8 to 15 percent slopes, severely eroded	35	75	1. 4	3. 1	55	140
HoD	Holston silt loam, 15 to 25 percent slopes	35	75	1. 5	3. 1	57	145
HoD3	Holston silt loam, 15 to 25 percent slopes, severely eroded			1. 3	2. 8	51	131
HfA	Huntington fine sandy loam, 0 to 5 percent slopes	65	100	2. 8	4. 0	70	140
HuA	Huntington silt loam, 0 to 3 percent slopes	70	105	3. 0	4. 3	100	180
LaB	Lakin loamy fine sand, 3 to 8 percent slopes	35	55	1. 7	2. 5	45	95
LaC	Lakin loamy fine sand, 8 to 15 percent slopes	35	55	1. 5	2. 5	40	90
LaD	Lakin loamy fine sand, 15 to 25 percent slopes						
LaE	Lakin loamy fine sand, 25 to 40 percent slopes						
LaE3	Lakin loamy fine sand, 25 to 40 percent slopes, severely eroded						
LkA	Lakin loamy sand, 0 to 3 percent slopes	35	55	1. 7	2. 5	50	100
LkB	Lakin loamy sand, 3 to 8 percent slopes	30	50	1. 5	2. 3	45	90
LsA	Lindside silt loam, 0 to 3 percent slopes	53	93	2. 2	3. 2	85	170
MaC	Markland silt loam, 6 to 12 percent slopes	40	80	2. 0	3. 5	70	150
MbC3	Markland silty clay loam, 6 to 12 percent slopes, severely eroded	35	75	1. 8	3. 2	65	140
MbD3	Markland silty clay loam, 12 to 25 percent slopes, severely eroded			1. 6	2. 9	55	125
McB	Markland and McGary silt loams, 2 to 6 percent slopes	35	75	1. 5	2. 7	60	140
MdB3	Markland and McGary silty clay loams, 2 to 6 percent slopes, severely eroded	35	75	1. 5	2. 7	55	135
MeA	Melvin silt loam, 0 to 3 percent slopes	35	80			70	130
MfA	Melvin silty clay loam, 0 to 3 percent slopes	30	65			50	115
MgA	Monongahela silt loam, 0 to 2 percent slopes	45	80	1. 7	3. 0	55	135
MgB	Monongahela silt loam, 2 to 6 percent slopes	45	80	1. 7	3. 0	50	130
MgC	Monongahela silt loam, 6 to 12 percent slopes	40	75	1. 6	2. 9	50	125
MgC3	Monongahela silt loam, 6 to 12 percent slopes, severely eroded	35	70	1. 5	2. 7	45	115
MoA	Moshannon silt loam, 0 to 3 percent slopes	70	95	2. 3	3. 7	95	175
MoB	Moshannon silt loam, 3 to 8 percent slopes	65	90	2. 2	3. 5	95	175
MoC	Moshannon silt loam, 8 to 15 percent slopes	60	85	2. 1	3. 2	90	170
MsC	Muskingum sandy loam, 10 to 20 percent slopes	35	65	1. 5	2. 2	40	75
MsD	Muskingum sandy loam, 20 to 30 percent slopes	30	65	1. 4	2. 0	35	70
MsD3	Muskingum sandy loam, 20 to 30 percent slopes, severely eroded			1. 3	1. 8	30	65
MsF	Muskingum sandy loam, 30 to 55 percent slopes						
MsF3	Muskingum sandy loam, 30 to 55 percent slopes, severely eroded						
MtB	Muskingum silt loam, 3 to 10 percent slopes	45	85	1. 7	3. 5	60	145
MtC	Muskingum silt loam, 10 to 20 percent slopes	40	80	1. 5	3. 3	55	140
MtD	Muskingum silt loam, 20 to 30 percent slopes	35	80	1. 3	3. 1	50	135
MtD3	Muskingum silt loam, 20 to 30 percent slopes, severely eroded			1. 1	2. 9	45	122
MtE	Muskingum silt loam, 30 to 40 percent slopes						
MuB	Muskingum-Upshur silt loams, 3 to 10 percent slopes	45	85	2. 1	3. 7	70	160
MuB3	Muskingum-Upshur silt loams, 3 to 10 percent slopes, severely eroded	40	80	2. 0	3. 6	64	155
MuC	Muskingum-Upshur silt loams, 10 to 20 percent slopes	35	75	2. 0	3. 6	63	150
MuC3	Muskingum-Upshur silt loams, 10 to 20 percent slopes, severely eroded	30	75	1. 8	3. 3	57	145
MuC4	Muskingum-Upshur silt loams, 10 to 20 percent slopes, very severely eroded						

See footnote at end of table.

TABLE 2.—*Estimated average acre yields of the major crops under two levels of management*—Continued

Soil symbol	Soil	Corn		Alfalfa-grass		Permanent pasture	
		A	B	A	B	A	B
		Bu.	*Bu.*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
MuD	Muskingum-Upshur silt loams, 20 to 30 percent slopes	30	75	1.6	3.1	55	140
MuD3	Muskingum-Upshur silt loams, 20 to 30 percent slopes, severely eroded	----	----	----	----	45	130
MuE	Muskingum-Upshur silt loams, 30 to 40 percent slopes	----	----	----	----	40	110
MuE3	Muskingum-Upshur silt loams, 30 to 40 percent slopes, severely eroded	----	----	----	----	----	----
MuF	Muskingum-Upshur silt loams, 40 to 55 percent slopes	----	----	----	----	----	----
MuF3	Muskingum-Upshur silt loams, 40 to 55 percent slopes, severely eroded	----	----	----	----	----	----
MvE	Muskingum-Upshur very stony loams, 30 to 40 percent slopes	----	----	----	----	----	----
MvF	Muskingum-Upshur very stony loams, 40 to 55 percent slopes	----	----	----	----	----	----
MvF3	Muskingum-Upshur very stony loams, 30 to 55 percent slopes, severely eroded	----	----	----	----	----	----
PuA	Purdy silt loam, 0 to 4 percent slopes	25	60	----	----	45	125
ScA	Sciotoville silt loam, 0 to 3 percent slopes	65	90	2.1	3.4	85	170
ScB	Sciotoville silt loam, 3 to 8 percent slopes	65	90	2.1	3.4	85	170
SeA	Senecaville silt loam, 0 to 3 percent slopes	55	90	2.2	3.2	85	170
TwA	Tilsit and Wharton silt loams, 0 to 3 percent slopes	45	80	1.7	3.0	55	140
TwB	Tilsit and Wharton silt loams, 3 to 8 percent slopes	40	75	1.7	3.0	50	135
TyA	Tyler silt loam, 0 to 2 percent slopes	30	70	----	----	60	130
TyB	Tyler silt loam, 2 to 6 percent slopes	30	70	----	----	60	130
UcB3	Upshur clay loam, 3 to 10 percent slopes, severely eroded	45	70	2.2	3.4	75	145
UcC3	Upshur clay loam, 10 to 20 percent slopes, severely eroded	40	65	2.0	3.1	70	130
UcC4	Upshur clay loam, 10 to 20 percent slopes, very severely eroded	----	----	----	----	----	----
UhB	Upshur silty clay loam, 3 to 10 percent slopes	55	80	2.4	3.6	80	150
UhC	Upshur silty clay loam, 10 to 20 percent slopes	50	75	2.2	3.2	75	140
UmD3	Upshur-Muskingum clay loams, 20 to 30 percent slopes, severely eroded	----	----	----	----	60	120
UmD4	Upshur-Muskingum clay loams, 20 to 30 percent slopes, very severely eroded	----	----	----	----	----	----
UmE3	Upshur-Muskingum clay loams, 30 to 40 percent slopes, severely eroded	----	----	----	----	----	----
UmE4	Upshur-Muskingum clay loams, 30 to 40 percent slopes, very severely eroded	----	----	----	----	----	----
UmF3	Upshur-Muskingum clay loams, 40 to 55 percent slopes, severely eroded	----	----	----	----	----	----
UmF4	Upshur-Muskingum clay loams, 40 to 55 percent slopes, very severely eroded	----	----	----	----	----	----
UpD	Upshur-Muskingum silty clay loams, 20 to 30 percent slopes	40	65	1.2	3.2	55	140
UpE	Upshur-Muskingum silty clay loams, 30 to 40 percent slopes	----	----	----	----	45	115
UpF	Upshur-Muskingum silty clay loams, 40 to 55 percent slopes	----	----	----	----	----	----
VaC3	Vandalia clay loam, 8 to 15 percent slopes, severely eroded	40	75	2.0	3.5	77	150
VaD3	Vandalia clay loam, 15 to 25 percent slopes, severely eroded	----	----	1.7	3.1	70	140
VaE3	Vandalia clay loam, 25 to 35 percent slopes, severely eroded	----	----	----	----	----	----
VaD4	Vandalia clay loam, 15 to 35 percent slopes, very severely eroded	----	----	----	----	----	----
VdB	Vandalia silt loam, 3 to 8 percent slopes	55	90	2.5	3.8	85	165
VdC	Vandalia silt loam, 8 to 15 percent slopes	50	85	2.3	3.6	80	160
VdD	Vandalia silt loam, 15 to 25 percent slopes	45	80	2.1	3.4	75	155
VdE	Vandalia silt loam, 25 to 35 percent slopes	----	----	----	----	70	145
VsB	Vandalia silty clay loam, 3 to 8 percent slopes	50	85	2.5	3.8	90	170
VsC	Vandalia silty clay loam, 8 to 15 percent slopes	47	80	2.3	3.6	85	165
VsD	Vandalia silty clay loam, 15 to 25 percent slopes	45	75	2.1	3.4	80	155
VsD3	Vandalia silty clay loam, 15 to 25 percent slopes, severely eroded	----	----	1.8	3.0	75	150
VsE	Vandalia silty clay loam, 25 to 35 percent slopes	----	----	----	----	75	150
VvC	Vandalia very stony silt loam, 5 to 15 percent slopes	----	----	----	----	80	125
VvD	Vandalia very stony silt loam, 15 to 35 percent slopes	----	----	----	----	75	120
WeC	Westmoreland silt loam, 10 to 20 percent slopes	55	85	1.8	2.2	65	150
WeD3	Westmoreland silt loam, 20 to 30 percent slopes, severely eroded	----	----	----	----	60	140
WeE3	Westmoreland silt loam, 30 to 40 percent slopes, severely eroded	----	----	----	----	----	----
WeF3	Westmoreland silt loam, 40 to 55 percent slopes, severely eroded	----	----	----	----	----	----
WfA	Wheeling fine sandy loam, 0 to 3 percent slopes	65	100	2.6	4.0	70	140
WfB	Wheeling fine sandy loam, 3 to 8 percent slopes	60	95	2.4	3.8	60	130
WfC	Wheeling fine sandy loam, 8 to 15 percent slopes	55	85	2.2	3.4	50	115
WgA	Wheeling gravelly sandy loam, coarse subsoil variant, 0 to 3 percent slopes	45	80	2.3	3.7	55	120
WgB	Wheeling gravelly sandy loam, coarse subsoil variant, 3 to 8 percent slopes	40	75	2.2	3.6	50	115
WsA	Wheeling silt loam, 0 to 3 percent slopes	70	110	2.7	4.2	100	180

See footnote at end of table.

TABLE 2.—*Estimated average acre yields of the major crops under two levels of management*—Continued

Soil symbol	Soil	Corn		Alfalfa-grass		Permanent pasture	
		A	B	A	B	A	B
		Bu.	*Bu.*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
WsB	Wheeling silt loam, 3 to 8 percent slopes	65	105	2.7	4.2	100	180
WsC	Wheeling silt loam, 8 to 15 percent slopes	60	90	2.4	3.7	85	155
ZoB	Zoar silt loam, 2 to 6 percent slopes	45	80	1.7	3.0	50	130
ZoC	Zoar silt loam, 6 to 12 percent slopes	40	75	1.6	2.9	50	125
ZoC3	Zoar silt loam, 6 to 12 percent slopes, severely eroded	35	70	1.5	2.7	45	115
ZoD3	Zoar silt loam, 12 to 25 percent slopes, severely eroded			1.3	2.5	40	110

[1] The number of days a year a mature animal (cow, horse, or steer) can graze an acre without injury to the pasture.

$29,496 for sale of wood products. Most were such products as mine props, posts, pulpwood, and poles. Some saw logs are produced for home use and for sale. There are no large permanent sawmills in the area. Small portable mills do custom sawing and buy small tracts of timber, which are usually heavily cut. Landowners generally sell timber by the boundary without knowledge of timber volume or market value.

About 70,000 acres in steep, eroded areas in capability class VII should be converted to woodland use. Most of this acreage is now in low-grade pasture. Some of it will reforest naturally with acceptable species and good stands if protected from grazing. Most of it, however, will need to be planted; otherwise it will grow up in sassafras, hickory, persimmon, and other low-grade trees.

In the last decade, there has been a very noticeable tendency to let the steeper pastures revert to woods. Much of this woods is poorly stocked or stocked with inferior species. The total acreage of such woods will need to be considered in future forest management in Jackson and Mason Counties.

If the needed conversion were made, 51 percent of the acreage in these two counties would be in woodland. This would raise the average woodland area to 42 acres for each landowner.

Forest types

Jackson and Mason Counties lie in the central hardwoods forest region. The forest types common to these counties and the soils and sites (see section Uses of Woodland Site Classification) on which they occur (*5*)[3] are as follows:

Scarlet oak.—Scarlet oak predominates in this forest type. Associated trees are chestnut, white and post oaks, hickory, blackgum, shortleaf pine, and Virginia pine. This forest type is usually on the medium to poor sites. Such sites are dry, narrow ridges, and south- and west-facing slopes on middle and upper slope positions.

Chestnut oak.—Chestnut oak occurs in pure stands or is predominant. Commonly associated trees are scarlet, white, black, and post oaks, and Virginia and shortleaf pines. This type is usually on the poor sites—dry, narrow ridgetops and upper slope positions on the south- and west-facing slopes.

[3] Italic numbers in parentheses refer to Literature Cited, page 90.

White oak-northern red oak-hickory.—White and northern red oaks and hickory are the predominant trees in this forest type; black oak, however, is prominent in some areas. The hickories are pignut, mockernut, and shagbark. Associated trees are mostly white ash, red maple, beech, blackgum, elm, and yellow-poplar. Flowering dogwood occurs in the understory. This forest type is on the good to medium sites on the upland soils. It occurs on lower slopes that face south and west and on middle and upper slopes that face the north and east. It also commonly occurs on the Monongahela, Holston, and other soils of the high terraces.

White oak.—White oak occurs in pure stands or is predominant in this forest type. Associated trees are black, northern red, and scarlet oaks, hickory, and white ash. This forest type occurs on drier sites of the upland soils than the white oak-northern red oak-hickory type, usually on middle and lower slopes with southerly and westerly exposures.

Yellow-poplar-white oak-northern red oak.—The trees generally associated with the predominant yellow-poplar and white and northern red oaks are black oak, blackgum, white ash, sugar maple, beech, elm, and basswood. This forest type is normally on the excellent to good sites of the upland soils. It occurs on lower and middle slopes with northerly and easterly exposures and on cove sites. It also occurs on the Monongahela, Holston, and other soils of the high terraces.

Yellow-poplar.—Yellow-poplar occurs in pure stands or is predominant. A few northern red oak, white ash, basswood, and other moist-site trees are associated in this forest type. This forest type usually results from heavy cuttings in woodland or by seeding in abandoned crop fields. It is patchy and seldom occurs on extensive areas. It normally occupies excellent to good sites on colluvial soils (Vandalia) and the north- and east-facing lower and middle slopes of the upland soils.

Sassafras-persimmon.—Sassafras and persimmon are predominant in this forest type. Commonly associated with these trees are hickory, oak, elm, and Eastern redcedar. This is a pioneer type. It takes over abandoned crop fields and pastures, usually on the medium to poor sites.

Virginia pine.—Virginia pine is in pure stands or is predominant in this forest type. Shortleaf pine, white, chestnut, and black oaks, and hickory are commonly associated in minor numbers. Shortleaf pine is predominant in some small areas. This is a pioneer type and occurs on old, abandoned fields and severely eroded pastures. It is usually on hilltop sites, but it is also in some abandoned fields on all sites and on soils near a source of seed.

Black locust.—Black locust occurs in pure stands or is predominant in this forest type; oak, hickory, and other hardwoods and Virginia pine are commonly associated with the predominant trees. This is a pioneer forest type that occupies abandoned crop fields and pastures, especially on the lime-influenced soils. It is widely distributed on a variety of soils and sites.

Pin oak-sweetgum.—The predominant trees in this forest type are pin oak and sweetgum. Commonly associated with the predominant trees are elm, hickory, swamp white oak, red maple, and green ash. This type occurs on the poorly drained soils on bottom lands and terraces (Markland, McGary, Melvin, and Purdy).

Potential productivity of woodland sites

Soils differ greatly in their potential capacity to produce a wood crop. The factors influencing tree growth are somewhat different from those influencing annual crops or pasture. Trees are a long-term crop and require decades to mature. At the present time soils are not treated or fertilized for the production of trees.

In north-central West Virginia, a study (*7*, *14*) to determine the major factors influencing productivity of soils for tree growth was made by the Northeastern Forest Experiment Station. Soil Conservation Service personnel applied the research by the measurement and analysis of soil woodland site plots for the important soils in Jackson and Mason Counties. Site index of upland oaks was used as the measure of productivity. Site index refers to the average height of the dominant and codominant trees in a normal stand of oak at the age of 50 years.

Oaks grown in even-aged stands are good indicators of productivity. Some oaks are on practically all sites, but the kind and number varies according to soil and conditions.

Even-aged oak stands were sampled to determine site index, and information was collected on such features as aspect, position on the slope, steepness of the slope, length of slope, type and depth of humus, soil series, soil texture, soil depth by horizons, rock content, and root concentration.

Analysis of the data revealed that four factors were related closely to the site index for oak in the Northern Appalachians. These factors are: (1) Aspect—the direction toward which the slope faces; (2) position on slope; (3) steepness of the slope; (4) soil depth to bedrock.

The site indexes for oak computed from the data were rated according to the relative inherent capacity of the site to produce trees:

Site index for oak:	*Site classes*
75 or more	Excellent.
65 to 74	Good.
55 to 64	Medium.
54 or less	Poor.

This site quality classification, although based on the site index for oak, may be used to estimate the quality of the site for other hardwoods. Species that normally grow together are assumed to react in the same way to site conditions. On a poor upland oak site, the growth of the stand will be low for most species. Conversely, any of the species that normally grow on a good oak site will have a good rate of growth.

The site-controlling factors determined by the study made by the Northwestern Forest Experiment Station were correlated on a tentative basis with plot data for the important soils in Jackson and Mason Counties. This information is shown in table 3. Some of this information, especially on the Muskingum-Upshur complex, is estimated from the original data and may be adjusted as more information becomes known about the relation of soil site to tree growth.

The site index is shown only for upland oaks in table 3. Information about the corresponding site index of the many other associated species is not yet known. This table is helpful in estimating the site quality of tracts of land in the county. By identifying the soils with the aid of the soil map, the approximate site quality can be obtained from the table. Where more than one site index value is indicated for a soil, it will be necessary to determine the topographic features classified in the table and use the appropriate site index values.

Use of a soil map and a stereoscope with a stereo pair of aerial photos is a practical way to determine the slope position and aspect. Other methods are also suitable.

Aspect is determined by locating a northwest-southeast line across the individual area to be analyzed. Slopes facing north or east of this line are shown in this table as NE. (northeast) aspects. Those facing south or west of this line are shown as SW. (southwest) aspects.

Slope position (upper, middle, or lower third) is determined by arbitrarily dividing each aspect area into three equal parts extending from the ridgetop to the stream edge or flood plain, or to the upper edge of a colluvial soil if present.

Once the site index is determined from table 3, potential growth and yield information for oaks can be estimated from table 4.

CONSERVATION OF WOODLAND BY SITE CLASSES

The suggestions for conservation of stands of upland oaks and the species that should be favored in natural stands (*15*) are discussed by site classes as follows:

Excellent sites (site index 75 and over).—Intensive management practices are justified on these sites. Short cutting cycles (10 years or less), permanent woods roads, thinning, and other woodland-improvement measures are economically feasible. Trees suitable for high-quality veneer, cooperage, and other specialty products can be grown.

These moist sites grow excellent trees of the more demanding species, such as yellow-poplar, black walnut, white ash, and red oak. Oaks are usually a minor part of the stand.

The trees that should be favored in natural stands in this site are yellow-poplar, white ash, black walnut, red, white, and black oaks, and white pine.

TABLE 3.—*Key to potential soil*

Soil symbol	Soil	Slope position [1]	Site index for upland oaks for stated slope and aspect: 0 to 20 percent, NE.	0 to 20 percent, SW.	20 to 40 percent, NE.	20 to 40 percent, SW.
AfA	Ashton fine sandy loam, 0 to 3 percent slopes		75+	75+		
AfB	Ashton fine sandy loam, 3 to 8 percent slopes					
AsA	Ashton silt loam, 0 to 3 percent slopes					
AsB	Ashton silt loam, 3 to 8 percent slopes					
AsC	Ashton silt loam, 8 to 15 percent slopes					
BcC3	Brooke clay loam, 6 to 12 percent slopes, severely eroded		75+	55 to 64		
BcD3	Brooke clay loam, 12 to 25 percent slopes, severely eroded					
ChA	Chilo sandy loam, 0 to 3 percent slopes					
DuB	Duncannon silt loam, 3 to 8 percent slopes		75+	65 to 74		
DuC	Duncannon silt loam, 8 to 15 percent slopes					
DuC3	Duncannon silt loam, 8 to 15 percent slopes, severely eroded					
DuD	Duncannon silt loam, 15 to 25 percent slopes					
DuD3	Duncannon silt loam, 15 to 25 percent slopes, severely eroded					
DuE	Duncannon silt loam, 25 to 40 percent slopes				65 to 74	55 to 64
DuE3	Duncannon silt loam, 25 to 40 percent slopes, severely eroded					
GsA	Ginat silt loam, 0 to 3 percent slopes		65 to 74	65 to 74		
HaA	Hackers silt loam, 0 to 3 percent slopes		75+	75+		
HaB	Hackers silt loam, 3 to 8 percent slopes					
HoC	Holston silt loam, 8 to 15 percent slopes		75+	65 to 74		
HoC3	Holston silt loam, 8 to 15 percent slopes, severely eroded					
HoD	Holston silt loam, 15 to 25 percent slopes					
HoD3	Holston silt loam, 15 to 25 percent slopes, severely eroded					
HfA	Huntington fine sandy loam, 0 to 5 percent slopes		75+	75+		
HuA	Huntington silt loam, 0 to 3 percent slopes					
LaB	Lakin loamy fine sand, 3 to 8 percent slopes		65 to 74	55 to 64		
LaC	Lakin loamy fine sand, 8 to 15 percent slopes					
LaD	Lakin loamy fine sand, 15 to 25 percent slopes					
LaE	Lakin loamy fine sand, 25 to 40 percent slopes				65 to 74	54 or less
LaE3	Lakin loamy fine sand, 25 to 40 percent slopes, severely eroded					
LkA	Lakin loamy sand, 0 to 3 percent slopes		65 to 74	55 to 64		
LkB	Lakin loamy sand, 3 to 8 percent slopes					
LsA	Lindside silt loam, 0 to 3 percent slopes		75+	75+		
MaC	Markland silt loam, 6 to 12 percent slopes		65 to 74	65 to 74		
MbC3	Markland silty clay loam, 6 to 12 percent slopes, severely eroded.					
MbD3	Markland silty clay loam, 12 to 25 percent slopes, severely eroded.					
McB	Markland and McGary silt loams, 2 to 6 percent slopes					
MdB3	Markland and McGary silty clay loams, 2 to 6 percent slopes, severely eroded.					
MeA	Melvin silt loam, 0 to 3 percent slopes					
MfA	Melvin silty clay loam, 0 to 3 percent slopes					
MgA	Monongahela silt loam, 0 to 2 percent slopes		65 to 74	65 to 74		
MgB	Monongahela silt loam, 2 to 6 percent slopes					
MgC	Monongahela silt loam, 6 to 12 percent slopes					
MgC3	Monongahela silt loam, 6 to 12 percent slopes, severely eroded.					
MoA	Moshannon silt loam, 0 to 3 percent slopes		75+	75+		
MoB	Moshannon silt loam, 3 to 8 percent slopes					
MoC	Moshannon silt loam, 8 to 15 percent slopes					

See footnotes at end of table.

productivity for woodlands

Site index for upland oaks for stated slope and aspect—Continued: Greater than 40 percent, NE.	Site index for upland oaks for stated slope and aspect—Continued: Greater than 40 percent, SW.	Limitation on use of equipment	Erosion risk	Remarks
------------	------------	Slight------	Moderate---	Used for intensive agriculture and for industrial and urban sites; some limited areas may be used for a short-term woodland crop, such as Christmas trees; spruce, fir, and pine are suitable for this purpose.
------------	------------	Moderate---	Moderate---	Woodland area limited in extent and mostly in volunteer black locust; excellent soil for production of locust posts.
------------	------------	Severe-----	Slight------	Poorly drained; not suitable for upland oaks; pin oak, red gum are suited; site index for pin oak is about 100.
------------	------------	Slight------	Moderate---	Suitable for wide range of local trees,[2] both hardwoods and conifers; good for production of pine and spruce for Christmas trees.
------------	------------	Slight------	Moderate---	Same.
------------	------------	Severe-----	Slight------	Woodland area very limited.
------------	------------	Slight------	Slight------	Used for intensive agriculture; woodland area very limited; suitable for pine, spruce, and fir for Christmas trees.
------------	------------	Slight------	Moderate---	Suitable for a wide range of local hardwoods and conifers.[2] Especially well suited to production of pine, spruce, and fir for Christmas trees.
------------	------------	Slight------	Slight------	Used for intensive agriculture; floods occasionally; only about 138 acres in woodland.
------------	------------	Moderate---	Moderate---	Better suited to conifers than hardwoods;[2] dry season following planting may cause higher than normal loss; white pine is well suited to reforestation; Scotch pine is a good selection for Christmas-tree planting; when logging is done, special care is needed to lay out roads or gentle grades; erosion control measures should be used immediately after logging.
------------	------------	Moderate---	Moderate---	Same.
------------	------------	Slight------	Slight------	Same.
------------	------------	Slight------	Slight------	Used for intensive agriculture; only 141 acres in woodland; suitable for pine, spruce, and fir for Christmas trees, but grass competition is usually severe.
------------	------------	Severe-----	Severe-----	Suitable for growing pine and spruce for Christmas trees, but grass competition may be severe; logging should be done in summer or early in fall.
------------	------------	Severe-----	Moderate--	Performance of upland oaks or conifers is not known; pin oak is suited; site index about 100 for pin oak.
------------	------------	Severe-----	Slight------	Same.
------------	------------	Moderate--	Moderate--	Suitable for a wide variety of local trees, including both hardwoods and conifers;[2] plant trees in the spring to avoid winter heaving; erosion control measures should be used on logging roads and skid trails immediately after logging.
------------	------------	Slight------	Slight------	Woodland areas are very small.

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TABLE 3.—*Key to potential soil*

Soil symbol	Soil	Slope position [1]	Site index for upland oaks for stated slope and aspect: 0 to 20 percent, NE.	0 to 20 percent, SW.	20 to 40 percent, NE.	20 to 40 percent, SW.
MsC	Muskingum sandy loam, 10 to 20 percent slopes	Middle Upper	65 to 74 55 to 64	55 to 64 54 or less		
MsD MsD3	Muskingum sandy loam, 20 to 30 percent slopes Muskingum sandy loam, 20 to 30 percent slopes, severely eroded.	Lower Middle Upper			65 to 74 65 to 74 55 to 64	55 to 64 54 or less 54 or less
MsF MsF3	Muskingum sandy loam, 30 to 55 percent slopes Muskingum sandy loam, 30 to 55 percent slopes, severely eroded.	Lower Middle Upper			65 to 74 65 to 74 55 to 64	55 to 64 54 or less 54 or less
MtB MtC	Muskingum silt loam, 3 to 10 percent slopes Muskingum silt loam, 10 to 20 percent slopes	Lower Middle Upper	75+ 75+ 65 to 74	65 to 74 65 to 74 55 to 64	75+	
MtD MtD3 MtE	Muskingum silt loam, 20 to 30 percent slopes Muskingum silt loam, 20 to 30 percent slopes, severely eroded Muskingum silt loam, 30 to 40 percent slopes	Lower Middle Upper			75+ 65 to 74 65 to 74	65 to 74 55 to 64 55 to 64
MuB MuB3 MuC MuC3	Muskingum-Upshur silt loams, 3 to 10 percent slopes Muskingum-Upshur silt loams, 3 to 10 percent slopes, severely eroded. Muskingum-Upshur silt loams, 10 to 20 percent slopes Muskingum-Upshur silt loams, 10 to 20 percent slopes, severely eroded.		65 to 74	55 to 64		
MuC4	Muskingum-Upshur silt loams, 10 to 20 percent slopes, very severely eroded.		65 to 74	55 to 64		
MuD MuD3 MuE MuE3	Muskingum-Upshur silt loams, 20 to 30 percent slopes Muskingum-Upshur silt loams, 20 to 30 percent slopes, severely eroded. Muskingum-Upshur silt loams, 30 to 40 percent slopes Muskingum-Upshur silt loams, 30 to 40 percent slopes, severely eroded.				65 to 74	55 to 64
MuF MuF3	Muskingum-Upshur silt loams, 40 to 55 percent slopes Muskingum-Upshur silt loams, 40 to 55 percent slopes, severely eroded.					
MvE	Muskingum-Upshur very stony loams, 30 to 40 percent slopes.				65 to 74	55 to 64
MvF MvF3	Muskingum-Upshur very stony loams, 40 to 55 percent slopes. Muskingum-Upshur very stony loams, 30 to 55 percent slopes, severely eroded.					
PuA	Purdy silt loam, 0 to 4 percent slopes					
ScA ScB	Sciotoville silt loam, 0 to 3 percent slopes Sciotoville silt loam, 3 to 8 percent slopes		65 to 74	65 to 74		
SeA	Senecaville silt loam, 0 to 3 percent slopes		75+	75+		
TwA TwB	Tilsit and Wharton silt loams, 0 to 3 percent slopes Tilsit and Wharton silt loams, 3 to 8 percent slopes		65 to 74	65 to 74		

See footnotes at end of table.

productivity for woodlands—Continued

Site index for upland oaks for stated slope and aspect—Continued: Greater than 40 percent, NE.	Greater than 40 percent, SW.	Limitation on use of equipment	Erosion risk	Remarks
----------	----------	Slight	Slight	Occurs in small areas in widely scattered locations; total area is less than 1,500 acres.
----------	----------			
----------	----------			
----------	----------	Slight	Slight	Same.
----------	----------			
65 to 74	54 or less			
55 to 64	54 or less	Moderate	Moderate	Same.
54 or less	54 or less			
----------	----------			
----------	----------	Slight	Slight	Same.
----------	----------			
----------	----------			
----------	----------	Slight	Moderate	Same.
----------	----------			
----------	----------	Moderate	Severe	Suitable for all trees that grow under local conditions, both hardwoods and conifers;[2] accessible areas with slopes under 30 percent suitable for Christmas trees, but grass and brush competition may be severe; high erosion risk on these soils; logging roads and skid trails should be laid out on gentle grades (under 15 percent); water-disposal systems should be carefully maintained during logging; erosion control measures should be used on logging roads and skid trails immediately after logging; special care may be needed in locating logging roads and skid trails on the stony units; logging during winter with heavy equipment is difficult.
----------	----------	Severe	Severe	Suitable for all trees that grow under local conditions, both hardwoods and conifers;[2] accessible areas with slopes under 30 percent suitable for Christmas trees, but grass and brush competition may be severe; high erosion risk on these soils; logging roads and skid trails should be laid out on gentle grades (under 15 percent); water-disposal systems should be carefully maintained during logging; erosion control measures should be used on logging roads and skid trails immediately after logging; special care may be needed in locating logging roads and skid trails on the stony units; logging during winter with heavy equipment is difficult.
----------	----------	Moderate	Severe	Same.
65 to 74	55 to 64	Moderate	Severe	Same.
----------	----------	Moderate	Moderate	Same.
65 to 74	55 to 64	Severe	Severe	Same.
----------	----------	Severe	Slight	Very limited area; performance of upland oaks or conifers not known; pin oak is suited; site index for pin oak is about 100.
----------	----------	Moderate	Slight	Used for intensive agriculture and industrial sites; area in woodland very limited.
----------	----------	Moderate	Slight	Woodland areas are small and patchy; suitable for Christmas trees (pines, spruces, firs) but grass competition may be severe; spring planting is preferred.
----------	----------	Moderate	Moderate	Suitable for local hardwoods and conifers;[2] well suited to pine and spruce for Christmas trees.

TABLE 3.—*Key to potential soil*

Soil symbol	Soil	position [1]	Site index for upland oaks for stated slope and aspect: 0 to 20 percent, NE.	0 to 20 percent, SW.	20 to 40 percent, NE.	20 to 40 percent, SW.
TyA	Tyler silt loam, 0 to 2 percent slopes	}	55 to 64	55 to 64		
TyB	Tyler silt loam, 2 to 6 percent slopes	}				
UcB3	Upshur clay loam, 3 to 10 percent slopes, severely eroded	}	65 to 74	55 to 64		
UcC3	Upshur clay loam, 10 to 20 percent slopes, severely eroded	}				
UcC4	Upshur clay loam, 10 to 20 percent slopes, very severely eroded.		65 to 74	55 to 64		
UhB	Upshur silty clay loam, 3 to 10 percent slopes	}	65 to 74	55 to 64		
UhC	Upshur silty clay loam, 10 to 20 percent slopes	}				
UmD3	Upshur-Muskingum clay loams, 20 to 30 percent slopes, severely eroded.		65 to 74	55 to 64		
UmD4	Upshur-Muskingum clay loams, 20 to 30 percent slopes, very severely eroded.		55 to 64	54 or less		
UmE3	Upshur-Muskingum clay loams, 30 to 40 percent slopes, severely eroded.		65 to 74	55 to 64		
UmE4	Upshur-Muskingum clay loams, 30 to 40 percent slopes, very severely eroded.		55 to 64	54 or less		
UmF3	Upshur-Muskingum clay loams, 40 to 55 percent slopes, severely eroded.					
UmF4	Upshur-Muskingum clay loams, 40 to 55 percent slopes, very severely eroded.					
UpD	Upshur-Muskingum silty clay loams, 20 to 30 percent slopes	}Middle	65 to 74	55 to 64		
UpE	Upshur-Muskingum silty clay loams, 30 to 40 percent slopes	}				
UpF	Upshur-Muskingum silty clay loams, 40 to 55 percent slopes	Middle				
VaC3	Vandalia clay loam, 8 to 15 percent slopes, severely eroded	}	75+	75+		
VaD3	Vandalia clay loam, 15 to 25 percent slopes, severely eroded	}				
VaE3	Vandalia clay loam, 25 to 35 percent slopes, severely eroded				75+	65 to 74
VaD4	Vandalia clay loam, 15 to 35 percent slopes, very severely eroded.		65 to 74	65 to 74	65 to 74	55 to 64
VdB	Vandalia silt loam, 3 to 8 percent slopes	}	75+	75+		
VdC	Vandalia silt loam, 8 to 15 percent slopes	}				
VdD	Vandalia silt loam, 15 to 25 percent slopes	}				
VdE	Vandalia silt loam, 25 to 35 percent slopes				75+	65 to 74
VsB	Vandalia silty clay loam, 3 to 8 percent slopes	}	75+	75+		
VsC	Vandalia silty clay loam, 8 to 15 percent slopes	}				
VsD	Vandalia silty clay loam, 15 to 25 percent slopes	}				
VsD3	Vandalia silty clay loam, 15 to 25 percent slopes, severely eroded.	}				

See footnotes at end of table.

productivity for woodlands—Continued

Site index for upland oaks for stated slope and aspect—Continued: Greater than 40 percent, NE.	Site index for upland oaks for stated slope and aspect—Continued: Greater than 40 percent, SW.	Limitation on use of equipment	Erosion risk	Remarks
		Moderate	Slight	Very limited woodland area.
		Severe	Severe	Suitable for all trees that grow under local conditions, both hardwoods and conifers;[2] accessible areas with slopes under 30 percent suitable for Christmas trees, but grass and brush competition may be severe; high erosion risk on these soils; logging roads and skid trails should be laid out on gentle grades (under 15 percent); water-disposal systems should be carefully maintained during logging; erosion control measures should be used on logging roads and skid trails immediately after logging; special care may be needed in locating logging roads and skid trails on the stony units; logging during winter with heavy equipment is difficult.
		Severe	Severe	Same.
		Moderate	Severe	Same.
		Severe	Severe	Same.
		Severe	Severe	Same.
		Severe	Severe	Suitable for all trees that grow under local conditions, both hardwoods and conifers;[2] accessible areas with slopes under 30 percent suitable for Christmas trees, but grass and brush competition may be severe; high erosion risk on these soils; logging roads and skid trails should be laid out on gentle grades (under 15 percent); water-disposal systems should be carefully maintained during logging; erosion control measures should be used on logging roads and skid trails immediately after logging; special care may be needed in locating logging roads and skid trails on the stony units; logging during winter with heavy equipment is difficult.
		Severe	Severe	Same.
65 to 74	55 to 64	Severe	Severe	Same.
54 or less	54 or less	Severe	Severe	Same.
		Moderate	Severe	Same.
65 to 74	55 to 64	Moderate	Severe	Same.
		Moderate	Moderate	Highly accessible and productive areas especially well suited to production of high-quality hardwood timber;[2] production of Christmas trees is practical on nonstony areas with slopes under 30 percent, but grass and brush competition may be severe; black locust is preferred for planting very severely eroded areas. Erosion control measures should be used on skid trails immediately after logging.
		Moderate	Severe	Same.
		Severe	Severe	Same.
		Moderate	Moderate	Same.
		Moderate	Moderate	Same.
		Moderate	Moderate	Same.

TABLE 3.—*Key to potential soil*

Soil symbol	Soil	Slope position [1]	Site index for upland oaks for stated slope and aspect			
			0 to 20 percent		20 to 40 percent	
			NE.	SW.	NE.	SW.
VsE	Vandalia silty clay loam, 25 to 35 percent slopes	--	--	--	75+	65 to 74
VvC VvD	Vandalia very stony silt loam, 5 to 15 percent slopes Vandalia very stony silt loam, 15 to 35 percent slopes	--	75+	75+	--	--
WeC	Westmoreland silt loam, 10 to 20 percent slopes	Lower Middle Upper	75+ 75+ 75+	65 to 74 65 to 74 55 to 64	-- -- --	-- -- --
WeD3 WeE3	Westmoreland silt loam, 20 to 30 percent slopes, severely eroded. Westmoreland silt loam, 30 to 40 percent slopes, severely eroded.	Lower Middle Upper	-- -- --	-- -- --	75+ 65 to 74 65 to 74	65 to 74 55 to 64 55 to 64
WeF3	Westmoreland silt loam, 40 to 55 percent slopes, severely eroded.	Lower Middle Upper	-- -- --	-- -- --	-- -- --	-- -- --
WfA WfB WfC	Wheeling fine sandy loam, 0 to 3 percent slopes Wheeling fine sandy loam, 3 to 8 percent slopes Wheeling fine sandy loam, 8 to 15 percent slopes	--	--	--	--	--
WgA WgB WsA WsB WsC	Wheeling gravelly sandy loam, coarse subsoil variant, 0 to 3 percent slopes. Wheeling gravelly sandy loam, coarse subsoil variant, 3 to 8 percent slopes. Wheeling silt loam, 0 to 3 percent slopes Wheeling silt loam, 3 to 8 percent slopes Wheeling silt loam, 8 to 15 percent slopes	--	--	--	--	--
ZoB ZoC ZoC3 ZoD3	Zoar silt loam, 2 to 6 percent slopes Zoar silt loam, 6 to 12 percent slopes Zoar silt loam, 6 to 12 percent slopes, severely eroded Zoar silt loam, 12 to 25 percent slopes, severely eroded	--	--	65 to 74	--	--

[1] Blank space indicates that slope position is not a variable.
[2] See section Conservation of Woodland by Site Classes for preferred trees in natural stands according to site index. See section Suggestions for Planting Trees for preferred trees for planting according to site index.

Good sites (site index 65 to 74).—Growth rates and species are not as good as those for excellent sites. Intensive management, however, is justified. The more demanding species that grow on the excellent sites also grow on these sites, but the oaks, especially northern red oak, make up a larger part of the stand. High-quality timber can be grown on these sites in cutting cycles of 15 to 20 years. Permanent woods roads are considered to be economically feasible.

The same trees should be favored in natural stands on these sites as on excellent sites.

Medium sites (site index 55 to 64).—Oaks are the most numerous trees on these sites, but some Virginia and shortleaf pines occur. These sites can grow good timber, but long rotations are necessary. Thinning, pruning, and other intensive cultural measures may not be profitable. Permanent logging roads may not be desirable because of long cutting cycles (20 to 30 years).

Red, black, and white oaks, shortleaf pine, and white pine should be favored in natural stands. All conifers should be favored.

Poor sites (site index 54 or less).—These sites are poor for the production of hardwood timber. Better returns can probably be expected from pines (Virginia and shortleaf). The least desirable kinds of oaks (chestnut, scarlet, and post) are dominant. Growth rates are so slow that hardwood sawtimber cannot be produced economically under present market conditions. The greatest value of these sites is for watershed protection, wildlife habitat, and recreation. Trees for pulpwood, chemical wood, and posts can be produced on accessible areas. Production of Christmas trees, especially pines, may be feasible on the gentler slopes of these sites.

Shortleaf, Virginia, and white pines should be favored in natural stands.

USES OF WOODLAND SITE CLASSIFICATION

Woodland site classification can be useful to the conservationist, forester, and landowner and to those who buy woodland for investment.

The approximate acreage of the various site classes for any property can be determined from the soil survey map. The potential values of the land for production of the different forest types or species for timber can be estimated, particularly for oak stands. Good information is available on yields of oak stands such as those

productivity for woodlands—Continued

Site index for upland oaks for stated slope and aspect—Continued: Greater than 40 percent, NE.	SW.	Limitation on use of equipment	Erosion risk	Remarks
		Moderate	Moderate	Same.
		Moderate	Moderate	Same.
		Slight	Moderate	Woodland area limited in extent and mostly in volunteer black locust; excellent soil for production of locust posts.
		Slight	Moderate	Same.
75+ 65 to 74 55 to 64	55 to 64 55 to 64 54 or less	Moderate	Moderate	Same.
		Slight	Slight	Used for intensive agriculture, industrial sites, and urban areas; some limited areas may be used for a short-term tree crop such as Christmas trees; best suited to pines.
		Slight	Slight	Used for intensive agriculture, industrial sites, and urban areas; some limited areas may be used for a short-term tree crop such as Christmas trees; best suited to pines.
		Moderate	Moderate	Suitable for all local trees, including hardwoods and conifers;[2] trees should be planted in spring to avoid winter heaving; erosion control measures should be used on skid trails and logging roads immediately after logging.

in Jackson and Mason Counties. Potential yields per acre of oak stands on different sites are given in table 4. These yields reflect those of normally associated species.

The site classification will help the woodland owner to decide which cultural measures can be feasibly applied. For example, thinning and pruning can be profitable on excellent and good sites, doubtful on medium, and probably economically unsound on poor sites. Woodland site classification can also be used to help determine the location of permanent skid roads, the species to favor in native woodlands, and the suitable kinds of trees to plant.

TABLE 4.—*Estimated yields per acre of even-aged, fully stocked oak stands on different site classes (4)*

Site class	Yield at 50 years of merchantable stems to a top diameter of 4 inches outside the bark		Yield at 80 years; to an 8-inch top, inside the bark, including all trees having at least one 16-foot log
	Cords	*Cubic feet*	*Board feet (Scribner rule)*
Excellent	41	3, 450	19, 700
Good	33	2, 830	14, 100
Medium	26	2, 230	8, 350
Poor	19	1, 600	4, 000

The application of the simplest woodland conservation practices can in time bring about vast increases in the value of woodlands in Jackson and Mason Counties. Protection from grazing and the killing or removal of culls would rebuild depleted stands and increase farm income from woodlands.

The yield figures shown in table 4 are conservative. They do not reflect the wood growth that could be harvested as thinnings under intensive management. Actual yields under management could well be twice the above figures, particularly on excellent and good sites, where fine quality hardwoods for veneer logs, cooperage, and other specialty uses can be grown. Prime and select logs of white oak, red oak, yellow-poplar, and black walnut command premium prices, and attention should first be directed to woodland conservation measures on soils that can produce these trees.

Suggestions for planting trees

The original timber growth in this area consisted almost entirely of hardwoods. The oaks predominated. Some associated species on the better sites were yellow-poplar, white ash, and beech. Shortleaf and Virginia pines were associated with the oaks on the south and west slopes and on dry ridges. Very limited, scattered areas of white pine and hemlock occurred along some of the lower slopes of deep, narrow valleys.

Knowledge about original tree cover is a poor guide for choosing species to plant. Cropping, pasturing, and fires have destroyed the humus that covered the old forest floor, have lowered soil fertility and moisture-holding capacity, and have compacted the soil.

Kinds of trees suitable for planting on the different sites are as follows:

Excellent sites (site index 75 or more for upland oak).—Conifers: White pine, Norway spruce, European larch, Japanese larch, and Scotch pine for Christmas trees. Hardwoods: Yellow-popular, black locust, black walnut, red oak, white oak, and white ash.

Good sites (site index 65 to 74 for upland oak) and Medium sites (site index 55 to 64 for upland oak).—Conifers: White pine, shortleaf pine, Scotch pine (Christmas trees only), European larch, and Japanese larch. Hardwoods: Black locust and white ash.

Poor sites (site index 54 or less for upland oak).—Conifers: Shortleaf pine, Virginia pine, Scotch pine (Christmas trees only), white pine. Hardwoods: Black locust (for cover).

Very severely eroded sites (gullied areas).—Conifers: Virginia pine. Hardwoods: Black locust.

Poorly drained sites.—Conifers: Hemlock, northern whitecedar, white pine. Hardwoods: Pin oak.

Engineering Applications[4]

This section gives engineering characteristics of the soils of Jackson and Mason Counties and points out important features that are likely to influence engineering practices. It is provided to help engineers interpret the soil survey information contained in this report. *It does not, however, eliminate the need for sampling and testing for design and construction of specific engineering works.*

Information in this report can be used to:

(1) Make soil and land use studies that will aid in selecting and developing industrial, business, residential, and recreational sites.

(2) Make preliminary estimates of the engineering properties of soils in planning agricultural drainage systems, farm ponds, irrigation systems, and diversion terraces.

(3) Make preliminary evaluations of soil and site conditions that will aid in selecting highway and airport locations and in planning detailed investigations of the selected locations.

(4) Locate probable sources of gravel and other construction materials.

(5) Correlate performance of engineering structures with soil mapping units and thus develop information that will be useful in designing and maintaining the structures.

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

(7) Supplement information obtained from other published maps and reports and aerial photographs in order to make maps and reports that can be used readily by engineers.

(8) Develop other preliminary estimates of the engineering properties for construction pertinent to a particular area.

Some terms, commonly used by both soil scientists and engineers, have different meanings to each. Many of these terms, as used by soil scientists, are defined in the Glossary.

Estimated Engineering Classification and Physical Properties of Soils

Estimated engineering classifications according to the Unified Classification System (*13*) and the American Association of State Highway Officials (AASHO) (*1*) systems are given in table 5. A brief description and some estimated physical properties of each of the soils in the two counties are also given.

In the Unified system, two letters are used to designate each soil group. The letters used in table 5 are S, M, and C, which stand for sand, silt, and clay, respectively; and also L and H, which stand for low plasticity and high plasticity, respectively. Where the symbols of two soil separates are used, as SM, for sand and silt, the first letter stands for the predominant soil separate.

In the AASHO system, soil materials are classified in seven principal groups. The groups range from A–1, gravelly soils of high-bearing capacity, to A–7, clay soils having low-bearing capacity when wet.

In table 5 suitability as topsoil refers to suitability for use on cut and fill slopes for establishing vegetation. The ratings depend primarily on texture, inherent fertility, organic-matter content, and the presence or absence of large stone fragments.

Permeability refers to the movement of water through the undisturbed soil. The permeability depends largely on the soil texture and structure.

Available moisture capacity is the amount of water in a moist soil, at field capacity, that can be removed by plants. These ratings, expressed in inches of water per foot of soil depth, are of particular value to engineers engaged in irrigation practices.

Shrink-swell potential is a rating of the ability of soil material to change volume when subjected to changes in moisture. Those soil materials rated high are normally undesirable from the engineering standpoint, since the increase in volume when the dry soil is wetted is usually accompanied by a loss in bearing capacity.

[4] This section was prepared with the assistance of HAROLD M. RHODES, State conservation engineer for West Virginia.

Highway Engineering

Soil characteristics affecting highway engineering are rated in table 6, columns 2 through 5.

The rating of the soil material for road subgrade is based on the estimated AASHO classifications of the soil materials that would normally be used in the subgrade. In flat terrain the rating applies to the soil materials in the A and B horizons; in steeper terrain (6 percent slopes or steeper), it applies to the soil materials in the C horizon. Coarse-textured soil materials are rated good and fine-textured materials, fair or poor. The soil materials rated fair are silts with low plasticity; those rated poor are plastic clays that lose strength when wet. In areas where the water table is within 3 feet of the subgrade surface, silty materials should be rated poor instead of fair because they are very susceptible to damage by freezing and thawing.

The landslips, or landslides, referred to in table 6 are primarily detrital slides or debris flows. The upper few feet of soil material moves downhill over weathered bedrock or within colluvium at the foot of slopes. Generally slip hazard increases with increase in slope. Also, clayey soils are more susceptible to slips than coarser textured soils. The ratings are based mainly on field observations.

The factors affecting vertical alinement, or placement, of the roadway are listed under the two columns headed Materials and Drainage. Vertical alinement is influenced by the depth to bedrock and the type of bedrock in areas where natural slopes are steeper than about 6 percent. The difficulty of bedrock excavation and the chance of seepage along bedding planes in the bedrock should be investigated. Undesirable soil material within or slightly below the subgrade will influence the stability of the roadbed. A layer of very plastic clay, as in the Markland series, will impede internal drainage and will usually have low stability when wet. Desirable soil material within the soil profile, for example, the sand and gravel in the Wheeling series, makes a naturally stable subgrade.

Vertical alinement is also influenced by local drainage conditions. In areas that are occasionally or seasonally flooded, or that have a high water table, the pavement surface should be built at least 3 feet above high water or above the ground water table to provide satisfactory drainage. Intercepting ditches or underdrains will control subsurface seepage. Seepage over impermeable strata in the back slopes of cuts can cause overlying material to slide and, if serious enough, it may influence the location and cross-sectional design of the roadway.

Natural base-course materials are scarce in Jackson and Mason Counties except along the Ohio River. The only dependable sources of sand or gravel are the Wheeling and Lakin soils.

Conservation Engineering

Soil features important in planning and application of water management practices are shown in table 6, columns 6 through 9. These features are rated or described on the basis of estimates given in table 5, on actual test data for the Wheeling and Westmoreland soils in Marshall Count, W. Va. (*12*), and on field experience.

Soil drainage and construction of farm ponds, diversion terraces, and waterways are the main practices of conservation engineering used in these counties. Diversion terraces and waterways are used mainly on the Muskingum-Upshur, Upshur-Muskingum, and Vandalia soils. These soils do not differ significantly in their behavior when these practices are used.

One of the main uses of diversion terraces is to intercept hillside surface and subsurface water. They are used mostly along the lower edge of colluvial or upland soils, where these soils join soils of the terraces or bottom lands, such as Lindside, Melvin, Senecaville, and Sciotoville. In such places, ditches should be as deep as is feasible in order to intercept as much subsurface water as possible.

The hazard of landslips should be considered when planning diversion terraces. Landslips are most likely to occur on the Muskingum-Upshur, Upshur-Muskingum, and Vandalia soils. The bottom of the channel should be exactly on grade so that ponding will not occur.

Significant characteristics, such as the nature of the underlying rock and the soil material above it, are given in table 6 under Reservoir area. The Wheeling, Sciotoville, and Lakin soils are not generally suitable for ponds, because of the rapid permeability of the sandy material. However, if extraordinary precautions are taken during construction and bentonite is used as a sealing agent, some successful ponds can be built on these soils.

Soil materials suitable for use as embankments have been rated on the basis of their permeability and on the basis of their shear strength when compacted.

Thin, sandy layers, or lenses, may occur in any of the alluvial soils of the Ashton, Huntington, Lindside, Melvin, Moshannon, Senecaville, Monongahela, Holston, Ginat, and Chilo series. Detailed soil examination should be made, and sites with sandy layers should be avoided if possible. In many areas such permeable layers can be sealed by thorough mixing with clayey soil material, adequate compaction, and use of suitable additives.

The Muskingum-Upshur, Upshur-Muskingum, Upshur, and Westmoreland soils usually provide satisfactory pond sites if topography is favorable. Sandstone and shale bedrock occur in places, particularly in the units having Muskingum as one of the components. Such bedrock is a hazard to watertight construction. Landslips are a hazard in pond construction on the units containing Muskingum soils and on the Vandalia soils, particularly where seepage occurs. Excessively steep cuts and sideslopes should be avoided.

Good pond sites are common on the slack-water terraces of the Markland, McGary, Zoar, and Tyler soils, and on the Purdy soils.

Tile drainage is usually effective on the Lindside and Senecaville soils, and on Melvin silt loam. It is usually less effective on the areas of Melvin silty clay loam along the Kanawha River.

Soils with a slowly permeable claypan, as the McGary, Purdy, and Tyler, do not usually respond well to tile drainage. If the ditch is backfilled with coarse material to the top of the slowly permeable layer, drainage is fairly effective.

Very little irrigation is practiced at the present time. The Wheeling, Ashton, and Huntington soils, and the

TABLE 5.—*Brief description and estimated engineering*

Map symbol	Soil	Depth to seasonally high water table	Depth to bedrock	Brief site and soil description
		Feet	*Feet*	
AfA AfB	Ashton fine sandy loam, 0 to 3 percent slopes. Ashton fine sandy loam, 3 to 8 percent slopes.	5+	20+	Stratified alluvial material (loam to sandy loam) from limestone-influenced uplands.
AsA AsB AsC	Ashton silt loam, 0 to 3 percent slopes. Ashton silt loam, 3 to 8 percent slopes. Ashton silt loam, 8 to 15 percent slopes.	3+	20+	Stratified alluvial material (sandy loam to silty clay loam) from limestone-influenced uplands; low terraces above normal overflow.
BcC3 BcD3	Brooke clay loam, 6 to 12 percent slopes, severely eroded. Brooke clay loam, 12 to 25 percent slopes, severely eroded.	10+ 0 -1	3 -4	About 1 foot of silty clay loam to silty clay over about 2 to 3 feet of clay.
ChA	Chilo sandy loam, 0 to 3 percent slopes	----------	50+	About 1 foot of sandy loam over about 1 foot of sandy clay loam over about 1½ feet of sandy clay; underlain by stratified loamy sand and sand.
DuB DuC DuC3 DuD DuD3 DuE DuE3	Duncannon silt loam, 3 to 8 percent slopes. Duncannon silt loam, 8 to 15 percent slopes. Duncannon silt loam, 8 to 15 percent slopes, severely eroded. Duncannon silt loam, 15 to 25 percent slopes. Duncannon silt loam, 15 to 25 percent slopes, severely eroded. Duncannon silt loam, 25 to 40 percent slopes. Duncannon silt loam, 25 to 40 percent slopes, severely eroded.	5+	5 -50+	5 to 8 feet or more of uniform silt loam material occurring as a mantle over shale and sandstone bedrock.
GsA	Ginat silt loam, 0 to 3 percent slopes	0 -1	50+	About 2 feet of heavy silt loam over about 1 foot of silty clay loam; underlain by stratified fine silt and sand.
HaA HaB	Hackers silt loam, 0 to 3 percent slopes. Hackers silt loam, 3 to 8 percent slopes.	3+	8+	About 1 foot of silt loam over 5 feet of coarse silty clay loam or fine silt loam; underlain by irregularly stratified fine sand, narrow clay bands, and gravel.
HoC HoC3 HoD HoD3	Holston silt loam, 8 to 15 percent slopes. Holston silt loam, 8 to 15 percent slopes, severely eroded. Holston silt loam, 15 to 25 percent slopes. Holston silt loam, 15 to 25 percent slopes, severely eroded.	10+	4 -10+	4 to 10 feet or more of silt loam over shale and sandstone bedrock.
HfA HuA	Huntington fine sandy loam, 0 to 5 percent slopes. Huntington silt loam, 0 to 3 percent slopes.	3+	20+	8 feet of alluvial material ranging from silt loam to fine sandy loam; sandiness increases with depth; bottom lands subject to occasional flooding.
LaB LaC LaD LaE LaE3 LkA LkB	Lakin loamy fine sand, 3 to 8 percent slopes. Lakin loamy fine sand, 8 to 15 percent slopes. Lakin loamy fine sand, 15 to 25 percent slopes. Lakin loamy fine sand, 25 to 40 percent slopes. Lakin loamy fine sand, 25 to 40 percent slopes, severely eroded. Lakin loamy sand, 0 to 3 percent slopes. Lakin loamy sand, 3 to 8 percent slopes.	10+	10 -50+	Wind or water-deposited materials ranging from loamy fine sand, through loamy sand, to sand.
LsA	Lindside silt loam, 0 to 3 percent slopes	0 -2	20+	3 to 5 feet of alluvial material (silt loam to silty clay loam) on stratified materials; derived from sandstone and shale and some limestone; bottom lands that are subject to occasional or frequent flooding.

See footnotes at end of table.

classification and physical properties of soils

Depth from surface (typical profile)	Classification		Suitability as topsoil	Permeability	Available moisture capacity	Shrink-swell potential
	Unified	AASHO				
Inches				*Inches per hr.*	*Inches per foot of depth*	
0 - 10	SM	A-4	Good	0.8 - 5.0	1.0-1.4	Low.
10 - 38+	ML or SM	A-2 or A-4	Good	5.0 -10.0	1.0-1.4	Low.
0 - 10	ML	A-4	Good	0.8 - 5.0	2.2+	Low.
10 - 22	CL	A-6	Good	0.2 - 0.8	1.8-2.2	Low.
22 - 38	ML	A-4	Good	0.8 - 5.0	1.8-2.2	Low.
38+	ML or SM	A-2 or A-4	Good	5.0 -10.0	1.0-1.4	Low.
0 - 13	CL	A-6 or A-7	Good	0.2 - 0.8	1.4-1.8	Moderate.
13 - 35	CH	A-7	Fair	0.05 - 0.2	1.0-1.4	High.
0 - 13	SM or SC	A-4	Good	0.8 - 5.0	1-4.1.8	Low.
13 - 22	SC	A-6	Fair	0.2 - 0.8	1.0-1.4	Low.
22 - 37	CL	A-7 or A-6	Fair	0.05 - 0.2	1.0-1.4	Low.
37 - 48+	SM	A-2	Poor	10+	([1])	Low.
0 - 80+	ML	A-4	Good	0.2 - 0.8	1.8-2.2	Low.
0 - 22	ML or CL	A-6	Good	0.2 - 0.8	1.8-2.2	Low.
22 - 34	CL	A-6	Fair	.05 - 0.2	1.4-1.8	
34+	ML-SM	A-2 or A-4	Poor	0.2 - 0.8	1.4-1.8	
0 - 10	ML	A-4	Good	0.8 - 5.0	2.2+	Low.
10 - 72	CL	A-6	Good	0.2 - 0.8	1.4-1.8	Moderate.
72+	Variable		Poor	5.0 -10.0	([1])	
0 - 60+	ML	A-4	Good	0.2 - 0.8	1.8-2.2	Low.
0 -102+	SM	A-4	Good	0.8 - 5.0	1.4-1.8	Low.
0 -102	ML	A-4	Good	0.8 - 5.0	1.8-2.2	Low.
0 - 60+	SM	A-2	Unsuitable	10.0+	([1])	Low to none.
0 - 20	ML	A-4	Good	0.8 - 5.0	2.2+	Low.
20 - 60+	CL	A-6	Good	0.2 - 0.8	1.8-2.2	Moderate.

TABLE 5.—*Brief description and estimated engineering*

Map symbol	Soil	Depth to seasonally high water table	Depth to bedrock	Brief site and soil description
		Feet	*Feet*	
MaC	Markland silt loam, 6 to 12 percent slopes	1 -2	10+	1 foot of silt loam or silty clay loam over 1 foot of silty clay over 2 feet or more of clay; slack-water clay deposits usually 10 or more feet deep.
MbC3	Markland silty clay loam, 6 to 12 percent slopes, severely eroded.			
MbD3	Markland silty clay loam, 12 to 25 percent slopes, severely eroded.			
	McGary (mapped only with Markland soils)	½-1	10+	About ½ foot of fine silt loam over 3 feet or more of silty clay to clay; slack-water clay deposits 10 or more feet thick.
McB	Markland and McGary silt loams, 2 to 6 percent slopes.			See descriptions of Markland and of McGary soils
MdB3	Markland and McGary silty clay loams, 2 to 6 percent slopes, severely eroded.			
MeA	Melvin silt loam, 0 to 3 percent slope	0 -1	3 - 8+	1 to 1¼ feet of fine silt loam or silty clay loam over 2 to 3 feet or more silty clay loam; alluvium from uplands underlain by interbedded shale, sandstone, and some limestone.
MfA	Melvin silty clay loam, 0 to 3 percent slopes.			
MgA	Monongahela silt loam, 0 to 2 percent slopes	1½-2	5 -10+	1 foot of friable silt loam over 2 feet of firm silt loam over 2 feet of very firm silt loam or silty clay loam; terraces high above present flood plain.
MgB	Monongahela silt loam, 2 to 6 percent slopes.			
MgC	Monongahela silt loam, 6 to 12 percent slopes.			
MgC3	Monongahela silt loam, 6 to 12 percent slopes, severely eroded.			
MoA	Moshannon silt loam, 0 to 3 percent slopes	0 -3	2 -10+	¾ foot of silt loam over 3 feet of silty clay loam; underlain on stratified sand, silt, and some gravel.
MoB	Moshannon silt loam, 3 to 8 percent slopes.			
MoC	Moshannon silt loam, 8 to 15 percent slopes.			
MsC	Muskingum sandy loam, 10 to 20 percent slopes.	10+	1½ -3	1 to 1½ feet of silt loam or sandy loam over 1 foot of loose sandy loam; underlain by sandstone and shale bedrock.
MsD	Muskingum sandy loam, 20 to 30 percent slopes.			
MsD3	Muskingum sandy loam, 20 to 30 percent slopes, severely eroded.			
MsF	Muskingum sandy loam, 30 to 55 percent slopes.			
MsF3	Muskingum sandy loam, 30 to 55 percent slopes, severely eroded.			
MtB	Muskingum silt loam, 3 to 10 percent slopes.			
MtC	Muskingum silt loam, 10 to 20 percent slopes.			
MtD	Muskingum silt loam, 20 to 30 percent slopes.			
MtD3	Muskingum silt loam, 20 to 30 percent slopes, severely eroded.			
MtE	Muskingum silt loam, 30 to 40 percent slopes.			
MuB	Muskingum-Upshur silt loams, 3 to 10 percent slopes.			See descriptions of Muskingum and of Upshur soils
MuB3	Muskingum-Upshur silt loams, 3 to 10 percent slopes, severely eroded.			
MuC	Muskingum-Upshur silt loams, 10 to 20 percent slopes.			
MuC3	Muskingum-Upshur silt loams, 10 to 20 percent slopes, severely eroded.			
MuC4	Muskingum-Upshur silt loams, 10 to 20 percent slopes, very severely eroded.			
MuD	Muskingum-Upshur silt loams, 20 to 30 percent slopes.			
MuD3	Muskingum-Upshur silt loams, 20 to 30 percent slopes, severely eroded.			
MuE	Muskingum-Upshur silt loams, 30 to 40 percent slopes.			
MuE3	Muskingum-Upshur silt loams, 30 to 40 percent slopes, severely eroded.			

See footnotes at end of table.

classification and physical properties of soils—Continued

Depth from surface (typical profile)	Classification		Suitability as topsoil	Permeability	Available moisture capacity	Shrink-swell potential
	Unified	AASHO				
Inches				*Inches per hr.*	*Inches per foot of depth*	
0 - 12	CL	A-6	Good	0. 2 - 0. 8	1. 8-2. 2	Low.
12 - 25	CH	A-7	Fair	0. 05 - 0. 2	1. 4-1. 8	Moderate.
25 - 50+	CH	A-7	Poor	(2)	(1)	Moderate.
0 - 7	CL	A-6	Good	0. 2 - 0. 8	1. 4-1. 8	Low.
7 - 48+	CH	A-7	Poor	(2)	(1)	Moderate.
0 - 15	CL	A-6	Good	0. 8 - 5. 0	2. 2+	Low.
15 - 36+	CL	A-6	Good	0. 05 - 0. 2	1. 4-1. 8	Moderate.
0 - 10½	ML	A-4	Good	0. 8 - 5. 0	2. 2+	Low.
10½ - 28	ML	A-4	Fair	0. 2 - 0. 8	1. 8-2. 2	Low.
28 - 52	CL	A-6	Poor	0. 05 - 0. 2	1. 4-1.8	Moderate.
0 - 8	ML	A-6	Good	0. 8 - 5. 0	2. 2+	Low.
8 - 42	CL	A-7	Good	0. 8 - 5. 0	1. 8-2. 2	Moderate.
42+	SM to CL	A-2 to A-6	Poor	5. 0+	1. 4-1. 8	Low.
0 - 11	ML	A-4	Good	0. 2 - 0. 8	1. 4-1. 8	Low.
11 - 24	ML	A-4	Fair	0. 8 - 5. 0	1. 0-1. 4	Low.

TABLE 5.—*Brief description and estimated engineering*

Map symbol	Soil	Depth to seasonally high water table	Depth to bedrock	Brief site and soil description
		Feet	*Feet*	
MuF	Muskingum-Upshur silt loams, 40 to 55 percent slopes.	----------	----------	See descriptions of Muskingum and of Upshur soils.
MuF3	Muskingum-Upshur silt loams, 40 to 55 percent slopes, severely eroded.			
MvE	Muskingum-Upshur very stony loams, 30 to 40 percent slopes.			
MvF	Muskingum-Upshur very stony loams, 40 to 55 percent slopes.			
MvF3	Muskingum-Upshur very stony loams, 30 to 55 percent slopes, severely eroded.			
PuA	Purdy silt loam, 0 to 4 percent slopes	0	6–20+	¾ foot of silt loam over 1 foot of silty clay over 1½ feet of blocky silty clay loam or silty clay over massive silty clay or clay; slack-water terrace deposits.
ScA ScB	Sciotoville silt loam, 0 to 3 percent slopes Sciotoville silt loam, 3 to 8 percent slopes.	1½	50+	1½ feet silt loam over 2 feet of firm silty clay loam; underlain by stratified sandy loam and sand; gravel at 10 to 20 feet.
SeA	Senecaville silt loam, 0 to 3 percent slopes	0 –2	3+	3 to 5 feet of alluvial material; a silt loam surface soil over silty clay loam over mixed sand, silt, and gravel; loose shale may occur at depths below 2 feet along small streams.
TwA	Tilsit and Wharton silt loams, 0 to 3 percent slopes.	[3] 1½ –2	3 – 5	Tilsit: 2 feet of silt loam over 1½ feet of firm silty clay loam; underlain by shale and sandstone; occupies ridge tops with gentle slopes.
TwB	Tilsit and Wharton silt loams, 3 to 8 percent slopes.	----------	----------	Wharton: 1½ to 2 feet of silt loam over 2 feet of clay loam over clay shale; occurs on broad ridges.
TyA TyB	Tyler silt loam, 0 to 2 percent slopes Tyler silt loam, 2 to 6 percent slopes.	1 –1½	5 –10+	About 1 foot of silty clay loam over 2 to 2½ feet of silty clay usually over deep deposits of slack-water clay.
UcB3	Upshur clay loam, 3 to 10 percent slopes, severely eroded.	10+	3 – 5	½ foot of clay loam or silty clay loam over 3 feet of plastic sticky clay; underlain by 2 to 2½ feet of massive plastic clay grading into clay shale bedrock; occurs on ridges, saddles, and benches.
UcC3	Upshur clay loam, 10 to 20 percent slopes, severely eroded.			
UcC4	Upshur clay loam, 10 to 20 percent slopes, very severely eroded.			
UhB	Upshur silty clay loam, 3 to 10 percent slopes.			
UhC	Upshur silty clay loam, 10 to 20 percent slopes.			
UmD3	Upshur-Muskingum clay loams, 20 to 30 percent slopes, severely eroded.	----------	----------	See descriptions of Muskingum and of Upshur soils.
UmD4	Upshur-Muskingum clay loams, 20 to 30 percent slopes, very severely eroded.			
UmE3	Upshur-Muskingum clay loams, 30 to 40 percent slopes, severely eroded.			
UmE4	Upshur-Muskingum clay loams, 30 to 40 percent slopes, very severely eroded.			
UmF3	Upshur-Muskingum clay loams, 40 to 55 percent slopes, severely eroded.			
UmF4	Upshur-Muskingum clay loams, 40 to 55 percent slopes, very severely eroded.			
UpD	Upshur-Muskingum silty clay loams, 20 to 30 percent slopes.			
UpE	Upshur-Muskingum silty clay loams, 30 to 40 percent slopes.			
UpF	Upshur-Muskingum silty clay loams, 40 to 55 percent slopes.			

classification and physical properties of soils—Continued

Depth from surface (typical profile)	Classification		Suitability as topsoil	Permeability	Available moisture capacity	Shrink-swell potential
	Unified	AASHO				
Inches				*Inches per hr.*	*Inches per foot of depth*	
0 – 8	CL	A–6	Good	0. 2 – 0. 8	2. 2+	Low.
8 – 28	CH	A–7	Poor	0. 05 – 0. 2	1. 0–1. 4	Moderate.
28+	CH	A–7	Poor	(2)	1. 0	Moderate.
0 – 17	ML	A–4	Good	0. 8 – 5. 0	1. 8–2. 2	Low.
17 – 40	CL	A–6	Fair	0. 05 – 0. 2	1. 4–1. 8	Low.
40+	SM	A–2	Poor	10+	1. 0	Low.
0 – 7	ML	A–4	Good	0. 8 – 5. 0	2. 2+	Low.
7 – 34+	CL	A–6	Good	0. 2 – 0. 8	1. 8–2. 2	Moderate.
0 – 14	ML	A–4	Good	0. 2 – 0. 8	1. 8–2. 2	Low.
14 – 22	ML	A–4	Fair	0. 2 – 0. 8	1. 4–1. 8	Low.
22 – 40	CL	A–6	Poor	0. 05 – 0. 2	1. 0–1. 4	Low.
0 – 9	ML	A–4	Good	0. 8 – 5. 0	1. 4–1. 8	Low.
9 – 20	CL	A–6	Fair	0. 2 – 0. 8	1. 4–1. 8	Low.
20 – 40	CL or CH	A–7	Poor	0. 05 – 0. 2	1. 0–1. 4	Moderate.
0 – 14	CL	A–6	Good	0. 2 – 0. 8	1. 8–2. 2	Low.
14 – 42	CH	A–7	Poor	0. 05 – 0. 2	1. 4–1. 8	Moderate.
42+	CH	A–7	Poor	0. 05	1. 0–1. 4	Moderate.
0 – 7	CL or CH	A–6 or A–7	Fair	0. 2 – 0. 8	1. 8–2. 2	Moderate.
7 – 40	CH	A–7	Poor	0. 05 – 0. 002	1. 4–1. 8	High.
40 – 67	CH	A–7	Poor	0. 05 – 0. 002	1. 4–1. 8	High.

TABLE 5.—*Brief description and estimated engineering*

Map symbol	Soil	Depth to seasonally high water table	Depth to bedrock	Brief site and soil description
		Feet	*Feet*	
VaC3	Vandalia clay loam, 8 to 15 percent slopes, severely eroded.	5+	5 -10	1 foot of silt loam or silty clay loam over 2 feet of silty clay loam to clay over 2 feet of silty clay or clay; contains 20 to 30 percent of coarse fragments throughout profile; occurs at toe slopes and alluvial fans.
VaD3	Vandalia clay loam, 15 to 25 percent slopes, severely eroded.			
VaE3	Vandalia clay loam, 25 to 35 percent slopes, severely eroded.			
VaD4	Vandalia clay loam, 15 to 35 percent slopes, very severely eroded.			
VdB	Vandalia silt loam, 3 to 8 percent slopes.			
VdC	Vandalia silt loam, 8 to 15 percent slopes.			
VdD	Vandalia silt loam, 15 to 25 percent slopes.			
VdE	Vandalia silt loam, 25 to 35 percent slopes.			
VsB	Vandalia silty clay loam, 3 to 8 percent slopes.			
VsC	Vandalia silty clay loam, 8 to 15 percent slopes.			
VsD	Vandalia silty clay loam, 15 to 25 percent slopes.			
VsD3	Vandalia silty clay loam, 15 to 25 percent slopes, severely eroded.			
VsE	Vandalia silty clay loam, 25 to 35 percent slopes.			
VvC	Vandalia very stony silt loam, 5 to 15 percent slopes.			
VvD	Vandalia very stony silt loam, 15 to 35 percent slopes.			
WeC	Westmoreland silt loam, 10 to 20 percent slopes.	10+	2 - 4	About ½ foot of friable silt loam over 1½ to 2 feet silt loam or silty clay loam; underlain by interbedded calcareous shales and sandstone with some limestone in places; occurs on ridgetops.
WeD3	Westmoreland silt loam, 20 to 30 percent slopes, severely eroded.			
WeE3	Westmoreland silt loam, 30 to 40 percent slopes, severely eroded.			
WeF3	Westmoreland silt loam, 40 to 55 percent slopes, severely eroded.			
WfA	Wheeling fine sandy loam, 0 to 3 percent slopes.	50+	50+	1 foot of silt loam or fine sandy loam over about 2 feet of silt loam or silty clay loam over 1 foot of sandy clay loam over 3 feet of sandy loam or loamy sand; underlain by stratified sand; gravel occurs at depths of 10 feet or more; on Ohio River terraces.
WfB	Wheeling fine sandy loam, 3 to 8 percent slopes.			
WfC	Wheeling fine sandy loam, 8 to 15 percent slopes.			
WsA	Wheeling silt loam, 0 to 3 percent slopes	50+	50+	3 feet of silt loam over 2 feet of sandy loam, underlain by stratified sand and gravel at 10 feet or more on Ohio River terraces.
WsB	Wheeling silt loam, 3 to 8 percent slopes.			
WsC	Wheeling silt loam, 8 to 15 percent slopes.			
WgA	Wheeling gravelly sandy loam, coarse subsoil variant, 0 to 3 percent slopes.	50+	50+	2 feet of gravelly sandy loam on 1 foot of very gravelly loamy sand; underlain by stratified sand and gravel; on the Ohio River terraces.
WgB	Wheeling gravelly sandy loam, coarse subsoil variant, 3 to 8 percent slopes.			
ZoB	Zoar silt loam, 2 to 6 percent slopes	1½ -2	5 -10+	¾ foot of silt loam over 1 foot of silty clay loam over about 1½ feet of silty clay; underlain by massive clay that contains some thin sandy layers; occurs as slack-water deposits on stream and river terraces.
ZoC	Zoar silt loam, 6 to 12 percent slopes.			
ZoC3	Zoar silt loam, 6 to 12 percent slopes, severely eroded.			
ZoD3	Zoar silt loam, 12 to 25 percent slopes, severely eroded.			

[1] Less than 1.0 inch per foot.
[2] Less than 0.05 inch per hour.
[3] Perched.

classification and physical properties of soils—Continued

Depth from surface (typical profile)	Classification		Suitability as topsoil	Permeability	Available moisture capacity	Shrink-swell potential
	Unified	AASHO				
Inches				*Inches per hr.*	*Inches per foot of depth*	
0 - 6	CL	A-6	Good	0. 2 - 0. 8	1. 8-2. 2	Moderate.
6 - 33	CL to CH	A-7	Poor	0. 05 - 0. 2	1. 4-1. 8	High.
33 - 55	CH	A-7	Poor	0. 05 - 0. 2	1. 4-1. 8	High.
55+	CH	A-7	Poor	0. 05 - 0. 2	1. 0-1. 4	High.
0 - 6	ML	A-4	Good	0. 8 - 5. 0	2. 2+	Low.
6 - 20	CL	A-6	Good	0. 2 - 0. 8	1. 4-1. 8	Moderate.
20+						
0 - 12	ML or SM	A-4	Good	0. 8 - 5. 0	1. 8-2. 2	Low.
12 - 38	ML to CL	A-4 to A-6	Fair	0. 8 - 5. 0	1. 4-1. 8	Low.
38 - 49	SC	A-6	Fair	0. 8 - 5. 0	1. 0-1. 4	Low.
49 - 72	SM	A-2 to A-4	Unsuitable	10	1. 0	Low to none.
0 - 36		A-4	Good	0. 2 - 0. 8	2, 2+	Low.
36 - 60		A-2	Fair	0. 8 - 5. 0	1. 0-1. 4	Low.
0 - 25	SM to SC	A-4 or A-2	Fair	5. 0 -10. 0	1. 0-1. 4	Low.
25 - 35	SM to SC	A-4 or A-2	Unsuitable	10. 0+	1. 0	Low to none.
35+	SM	A-2	Unsuitable	10. 0+	1. 0	Low to none.
0 - 8	ML-CL	A-6	Good	0. 8 - 5. 0	2. 2+	Low.
8 - 19	CL	A-6	Fair	0. 2 - 0. 8	1. 4-1. 8	Moderate.
19 - 35	CH	A-7	Poor	0. 005- 0. 02	1. 0-1. 4	Moderate.
35+	CH	A-7	Poor	0. 005- 0. 02	1. 0	Moderate.

TABLE 6.—*Engineering*

Soil series and map symbol	Suitability of soil material for road subgrade	Susceptibility to landslips	Vertical alinement of highways: Materials	Vertical alinement of highways: Drainage
Ashton AfA, AfB, AsA, AsB, AsC.	Fair	None	(1)	Infrequent flooding
Brooke BcC3, BcD3.	Poor	Moderate	Plastic clay; bedrock.	(1)
Chilo ChA.	Poor [2]	None	(1)	Water table
Duncannon [3] DuB, DuC, DuC3, DuD, DuD3, DuE, DuE3.	Fair	Low	(1)	(1)
Ginat GsA.	Poor [2]	None	(1)	Water table
Hackers HaA, HaB.	Fair	None	(1)	Infrequent flooding
Holston HoC, HoC3, HoD, HoD3.	Fair	Low	(1)	(1)
Huntington HfA, HuA.	Fair	None	(1)	Water table; occasional flooding.
Lakin LaB, LaC, LaD, LaE, LaE3, LkA, LkB.	Good [4]	Low to none	(1)	(1)
Lindside LsA.	Fair	None	(1)	Water table; occasional flooding.
Markland MaC, MbC3, MbD3.	Poor	Low	Plastic clay	Water table
McGary [5] McB, MdB3.	Poor [2]	Low to none	Plastic clay	Water table
Melvin MeA, MfA.	Fair [2]	None	(1)	Water table; occasional to frequent flooding.
Monongahela MgA, MgB, MgC, MgC3.	Fair	Low to none	(1)	Perched water table
Moshannon MoA, MoB, MoC.	Fair	None	(1)	Water table; occasional to frequent flooding.
Muskingum MsC, MsD, MsD3, MsF, MsF3, MtB, MtC, MtD, MtD3, MtE.	Fair	Low	Bedrock	(1)
Muskingum-Upshur MuB, MuB3, MuC, MuC3, MuC4, MuD, MuD3, MuE, MuE3, MuF, MuF3, MvE, MvF, MvF3.	Fair to poor	High (serious hazard on slopes greater than 20 percent).	Bedrock	Seep spots
Purdy PuA.	Poor [2]	Low	Plastic clay	Perched water table
Sciotoville ScA, ScB.	Fair [6]	Low	(1)	Water table
Senecaville SeA.	Fair	None	(1)	Water table; occasional flooding.
Tilsit and Wharton TwA, TwB.	Fair to poor	Low	Bedrock	Seepage at 2 to 3 feet
Tyler TyA, TyB.	Poor [2]	Low	Plastic clay	Water table
Upshur UcB3, UcC3, UcC4, UhB, UhC.	Poor	High	Plastic clay	(1)
Upshur-Muskingum UmD3, UmD4, UmE3, UmE4, UmF3, UmF4, UpD, UpE, UpF.	Poor to fair	High	Plastic clay	(1)
Vandalia VaC3, VaD3, VaE3, VaD4, VdB, VdC, VdD, VdE, VsB, VsC, VsD, VsD3, VsE, VvC, VvD.	Poor	High	(1)	Some seepage
Westmoreland WeC, WeD3, WeE3, WeF3.	Fair	High	Bedrock	(1)
Wheeling WfA, WfB, WfC, WgA, WgB, WsA, WsB, WsC.	Fair to good [7]	None	Sand and gravel.	(1)
Zoar ZoB, ZoC, ZoC3, ZoD3.	Poor	Low	Plastic clay	(1)

[1] This feature will have little or no effect.
[2] Rated poor because of presence of water table.
[3] This soil may occur as a thin mantle over Wheeling or Muskingum-Upshur materials.
[4] Good source of sandy material.
[5] Mapped only with Markland soils in Jackson and Mason Counties.

interpretation of soils

Farm ponds		Agricultural drainage	Irrigation
Reservoir area	Embankment		
Very limited suitability; sandy substratum.	Fair shear strength	Well drained	Suitable; good response.
Very limited suitability; limestone bedrock.	Fair shear strength	Some seep spots	Not suitable; low infiltration rate.
Very limited suitability; sandy substratum.	Fair to poor shear strength	Poorly drained; slow permeability.	Not suitable.
Limited suitability; sandy substratum in places.	Fair shear strength	Well drained	Suitable.
Very limited suitability; sandy substratum.	Fair shear strength	Poorly drained; slow permeability.	Not suitable.
Usually suitable	Suitable	Well drained	Suitable; good response.
Usually suitable; a few sandy layers.	Fair shear strength	Well drained	Suitable.
Very limited suitability; sandy layers.	Fair shear strength	Well drained	Suitable.
Not suitable; rapidly permeable	Not suitable	Excessively drained	Low available moisture-holding capacity.
Generally suitable; a few sandy lenses.	Fair shear strength	Moderately well drained to somewhat poorly drained; somewhat slow permeability.	May need drainage before irrigating.
Suitable	Poor shear strength	Moderately well drained; slow permeability.	Poorly suited; slow permeability.
Suitable	Poor shear strength	Slow permeability	Not suitable.
Suitable	Fair shear strength	High water table; slow permeability.	Not suitable.
Limited suitability; sandy lenses in places.	Fair shear strength	Moderately well drained; fragipan 18 to 28 inches thick.	Slow permeability at 18 to 30 inches.
Usually suitable; a few sandy lenses.	Fair to good shear strength	Well drained	Suitable.
Limited suitability; a few seams in sandstone and shale.	Fair shear strength	Well drained	Suitable on gentle slopes.
Suitable	Some slump hazard; fair to poor shear strength.	Well drained; a few seep spots	Slow permeability.
Suitable	Poor shear strength	Very low permeability; poorly drained.	Not suitable.
Not suitable	Fair to good shear strength	Moderately well drained	Slow permeability at 18 to 30 inches.
Generally suitable; occasional sandy lenses.	Fair shear strength	Moderately well to somewhat poorly drained; somewhat slow permeability.	May need drainage before irrigating.
Suitable	Fair shear strength	Perched water on fragipan at 18 to 30 inches.	Slow permeability at 18 to 30 inches.
Good	Poor to fair shear strength	Somewhat poorly drained; slow permeability.	Not suitable.
Suitable	Some slump hazard; poor shear strength.	Well drained	Not suitable; slow permeability.
Suitable	Some slump hazard; poor to fair shear strength.	Well drained	Not suitable; slow permeability.
Good	Poor to fair shear strength	Well drained; occasional seep spots.	Suitable on gentle slopes.
Suitable	Fair shear strength	Well drained	Suitable.
Not suitable; rapidly permeable substratum.	Fair to good shear strength	Well drained	Suitable; good response.
Good	Fair to poor shear strength	Moderately well drained	Suitable.

[6] Good subgrade material (sand and gravel) occurs in underlying material.

[7] Substratum good source of sand and gravel. The coarse subsoil variants of Wheeling gravelly sandy loam are a particularly good source of sand and gravel.

Lakin soils on gentle slopes, are well suited to irrigation. All of these soils, however, are rapidly going out of agricultural use. The suitability of other soils for irrigation is shown in table 6.

Residential Development

The rapid growth of industry along the Ohio and Kanawha Rivers in these two counties has greatly increased residential development. Some features significantly affect the suitability of a site for residential development. Drainage, depth to bedrock, the nature of the subsoil and underlying material, the risk of landslips, and the risk of flooding should be considered when residential areas are planned. Information about these and other soil features is given in tables 5 and 6.

The Wheeling soils, and the Lakin soils on moderate slopes, are nearly ideal for building sites. They are deep and well drained, have permeable substrata, and are free from flooding. The Ashton and Huntington soils have internal physical properties very suitable for building sites, but these soils are subject to flooding. The Ashton soils may be covered with water when floods are extremely high. The Huntington soils are occasionally flooded.

The Moshannon soils have desirable physical properties for residential sites but are subject to occasional to frequent flooding. The Senecaville, Lindside, and Melvin soils are poorly suited to residential development because they not only are subject to occasional to frequent flooding but also have a seasonally high water table.

The development of satisfactory sewage disposal systems is a problem on soils with a claypan subsoil, such as the Markland, McGary, Tyler, and Purdy. The construction of dry basements is also difficult on these and other soils with a high water table.

Soils on which landslips readily occur should not be used for building sites. Landslips are a hazard on the Upshur, Upshur-Muskingum, Muskingum-Upshur, Brooke, and Vandalia soils, on slopes greater than 15 to 20 percent.

Descriptions of the Soils

This section provides detailed information about the soils. It describes the series and mapping units in the two counties. The mapping units are the areas on the detailed soil map at the back of this report. They are bounded by lines and identified by a letter symbol. For more general information about soils, the reader can refer to the section General Soil Map, in which broad patterns of soils are explained.

In this section the soil descriptions are arranged in alphabetical order by series name. Each soil series is described, as well as a soil profile representative of the series. The thickness, color, texture, structure, and consistence, as well as the nature of the lower boundary, are given for each horizon of the profile. Other characteristics that apply to a particular horizon are also given. The colors used in the profile description refer to moist soil unless otherwise indicated. The symbols in parentheses, such as (10YR 3/3), are color notations, which are used to describe color precisely. Except for the texture of the surface soil, all soils in one series have essentially the same kind of profile. The differences, if any, are explained.

Following the name of each soil mapping unit is the symbol used to identify that soil on the detailed soil map. The capability unit is given for each soil. Further information on use and management of a soil may be found in the subsection Management by Capability Units. The approximate acreage and proportionate extent of the soils are given in table 7. It will be helpful to refer to the Glossary, where series, type, phase, and other terms used in the report are defined.

A list of the mapping units and the symbol and capability unit of each are given in the back of the report.

TABLE 7.—*Approximate acreage and proportionate extent of soils in Jackson and Mason Counties, W. Va.*

Capability unit	Soil	Jackson		Mason		Total
		Acres	*Percent*	*Acres*	*Percent*	*Acres*
IIs–6	Ashton fine sandy loam, 0 to 3 percent slopes	95	(1)	300	0. 1	395
IIs–6	Ashton fine sandy loam, 3 to 8 percent slopes	29	(1)	70	(1)	99
I–6	Ashton silt loam, 0 to 3 percent slopes	509	0. 2	4, 051	1. 5	4, 560
IIe–6	Ashton silt loam, 3 to 8 percent slopes	116	(1)	851	. 3	967
IIIe–6	Ashton silt loam, 8 to 15 percent slopes	66	(1)	370	. 1	436
IVe–1	Brooke clay loam, 6 to 12 percent slopes, severely eroded	211	. 1	------	------	211
VIe–1	Brooke clay loam, 12 to 25 percent slopes, severely eroded	231	. 1	------	------	231
IIIw–1	Chilo sandy loam, 0 to 3 percent slopes	------	------	391	. 1	391
IIe–4	Duncannon silt loam, 3 to 8 percent slopes	86	(1)	451	. 2	537
IIIe–4	Duncannon silt loam, 8 to 15 percent slopes	87	(1)	341	. 1	428
IVe–3	Duncannon silt loam, 8 to 15 percent slopes, severely eroded	125	(1)	190	. 1	315
IVe–3	Duncannon silt loam, 15 to 25 percent slopes	152	. 1	160	. 1	312
VIe–2	Duncannon silt loam, 15 to 25 percent slopes, severely eroded	39	(1)	301	. 1	340
VIIe–2	Duncannon silt loam, 25 to 40 percent slopes	18	(1)	40	(1)	58
VIIe–2	Duncannon silt loam, 25 to 40 percent slopes, severely eroded	20	(1)	70	(1)	90
IIIw–1	Ginat silt loam, 0 to 3 percent slopes	96	(1)	891	. 3	987
I–6	Hackers silt loam, 0 to 3 percent slopes	1, 298	. 4	901	. 3	2, 199
IIe–6	Hackers silt loam, 3 to 8 percent slopes	269	. 1	180	. 1	449
IIIe–4	Holston silt loam, 8 to 15 percent slopes	461	. 2	1, 573	. 6	2, 034

See footnote at end of table.

TABLE 7.—*Approximate acreage and proportionate extent of soils in Jackson and Mason Counties, W. Va.*—Continued

Capability unit	Soil	Jackson		Mason		Total
		Acres	*Percent*	*Acres*	*Percent*	*Acres*
IVe-3	Holston silt loam, 8 to 15 percent slopes, severely eroded	134	(1)	771	0. 3	905
IVe-3	Holston silt loam, 15 to 25 percent slopes	29	(1)	180	. 1	209
VIe-2	Holston silt loam, 15 to 25 percent slopes, severely eroded	58	(1)	120	(1)	178
IIs-6	Huntington fine sandy loam, 0 to 5 percent slopes	95	(1)	100	(1)	195
I-6	Huntington silt loam, 0 to 3 percent slopes	566	. 2	1, 041	. 4	1, 607
IIIs-1	Lakin loamy fine sand, 3 to 8 percent slopes	105	(1)	380	. 1	485
IVs-1	Lakin loamy fine sand, 8 to 15 percent slopes	136	(1)	400	. 1	536
VIIs-2	Lakin loamy fine sand, 15 to 25 percent slopes	95	(1)	202	. 1	297
VIIs-2	Lakin loamy fine sand, 25 to 40 percent slopes	29	(1)	90	(1)	119
VIIs-2	Lakin loamy fine sand, 25 to 40 percent slopes, severely eroded	10	(1)	110	(1)	120
IIIs-1	Lakin loamy sand, 0 to 3 percent slopes	49	(1)	470	. 2	519
IIIs-1	Lakin loamy sand, 3 to 8 percent slopes	19	(1)	220	. 1	239
IIw-7	Lindside silt loam, 0 to 3 percent slopes	510	. 2	3, 421	1. 2	3, 931
IIIe-14	Markland silt loam, 6 to 12 percent slopes	223	. 1	904	. 3	1, 127
IVe-9	Markland silty clay loam, 6 to 12 percent slopes, severely eroded	384	. 1	682	. 2	1, 066
VIe-1	Markland silty clay loam, 12 to 25 percent slopes, severely eroded	507	. 2	520	. 2	1, 027
IIIw-5	Markland and McGary silt loams, 2 to 6 percent slopes	990	. 3	510	. 2	1, 500
IVe-9	Markland and McGary silty clay loams, 2 to 6 percent slopes, severely eroded	47	(1)	160	. 1	207
IIIw-1	Melvin silt loam, 0 to 3 percent slopes	504	. 2	3, 223	1. 2	3, 727
IVw-1	Melvin silty clay loam, 0 to 3 percent slopes	19	(1)	1, 501	. 5	1, 520
IIw-1	Monongahela silt loam, 0 to 2 percent slopes	576	. 2	540	. 2	1, 116
IIe-13	Monongahela silt loam, 2 to 6 percent slopes	905	. 3	2, 632	1. 0	3, 537
IIIe-13	Monongahela silt loam, 6 to 12 percent slopes	152	. 1	642	. 2	794
IVe-9	Monongahela silt loam, 6 to 12 percent slopes, severely eroded	39	(1)	480	. 2	519
IIw-6	Moshannon silt loam, 0 to 3 percent slopes	11, 893	4. 0	9, 330	3. 4	21, 223
IIe-6	Moshannon silt loam, 3 to 8 percent slopes	778	. 3	821	. 3	1, 599
IIIe-6	Moshannon silt loam, 8 to 15 percent slopes	165	. 1	180	. 1	345
IIIe-12	Muskingum sandy loam, 10 to 20 percent slopes	58	(1)	301	. 1	359
IVe-3	Muskingum sandy loam, 20 to 30 percent slopes	192	. 1	521	. 2	713
VIe-2	Muskingum sandy loam, 20 to 30 percent slopes, severely eroded	115	(1)	110	(1)	225
VIIe-2	Muskingum sandy loam, 30 to 55 percent slopes	586	. 2	752	. 3	1, 338
VIIe-2	Muskingum sandy loam, 30 to 55 percent slopes, severely eroded	289	. 1	262	. 1	551
IIe-10	Muskingum silt loam, 3 to 10 percent slopes	38	(1)	100	(1)	138
IIIe-10	Muskingum silt loam, 10 to 20 percent slopes	212	. 1	411	. 1	623
IVe-3	Muskingum silt loam, 20 to 30 percent slopes	67	(1)	150	. 1	217
VIe-2	Muskingum silt loam, 20 to 30 percent slopes, severely eroded	67	(1)	160	. 1	227
VIIe-2	Muskingum silt loam, 30 to 40 percent slopes	135	(1)	201	. 1	336
IIe-15	Muskingum-Upshur silt loams, 3 to 10 percent slopes	250	. 1	762	. 3	1, 012
IIIe-15	Muskingum-Upshur silt loams, 3 to 10 percent slopes, severely eroded	38	(1)	70	(1)	108
IIIe-15	Muskingum-Upshur silt loams, 10 to 20 percent slopes	1, 038	. 4	6, 725	2. 4	7, 763
IVe-15	Muskingum-Upshur silt loams, 10 to 20 percent slopes, severely eroded	2, 671	. 9	12, 602	4. 6	15, 273
VIIe-3	Muskingum-Upshur silt loams, 10 to 20 percent slopes, very severely eroded			220	. 1	220
IVe-15	Muskingum-Upshur silt loams, 20 to 30 percent slopes	1, 580	. 5	14, 399	5. 2	15, 979
VIe-3	Muskingum-Upshur silt loams, 20 to 30 percent slopes, severely eroded	4, 511	1. 5	26, 996	9. 8	31, 507
VIe-3	Muskingum-Upshur silt loams, 30 to 40 percent slopes	1, 796	. 6	18, 477	6. 7	20, 273
VIIe-1	Muskingum-Upshur silt loams, 30 to 40 percent slopes, severely eroded	3, 837	1. 3	20, 230	7. 3	24, 067
VIIe-1	Muskingum-Upshur silt loams, 40 to 55 percent slopes	992	. 3	17, 810	6. 4	18, 802
VIIe-1	Muskingum-Upshur silt loams, 40 to 55 percent slopes, severely eroded	2, 885	1. 0	13, 152	4. 8	16, 037
VIIs-1	Muskingum-Upshur very stony loams, 30 to 40 percent slopes	330	. 1	1, 100	. 4	1, 430
VIIs-1	Muskingum-Upshur very stony loams, 40 to 55 percent slopes	12, 739	4. 3	11, 669	4. 2	24, 408
VIIs-1	Muskingum-Upshur very stony loams, 30 to 55 percent slopes, severely eroded	9, 515	3. 2	5, 878	2. 1	15, 393
IVw-1	Purdy silt loam, 0 to 4 percent slopes	48	(1)	60	(1)	108
IIw-1	Sciotoville silt loam, 0 to 3 percent slopes	106	(1)	1, 021	. 4	1, 127
IIe-13	Sciotoville silt loam, 3 to 8 percent slopes	38	(1)	250	. 1	288
IIw-7	Senecaville silt loam, 0 to 3 percent slopes	2, 581	. 9	4, 146	1. 5	6, 727
	Sloping land, alluvial materials	330	(1)	350	. 1	680
IIw-1	Tilsit and Wharton silt loams, 0 to 3 percent slopes	460	. 2	1, 043	. 4	1, 503
IIe-13	Tilsit and Wharton silt loams, 3 to 8 percent slopes	3, 837	1. 3	5, 297	1. 9	9, 134
IIIw-5	Tyler silt loam, 0 to 2 percent slopes	402	. 1	90	(1)	492
IIIw-5	Tyler silt loam, 2 to 6 percent slopes	154	. 1	50	(1)	204
IIIe-30	Upshur clay loam, 3 to 10 percent slopes, severely eroded	431	. 1	340	. 1	771
IVe-1	Upshur clay loam, 10 to 20 percent slopes, severely eroded	19, 251	6. 5	7, 930	2. 9	27, 181
VIIe-1	Upshur clay loam, 10 to 20 percent slopes, very severely eroded	135	(1)	170	. 1	305
IIIe-30	Upshur silty clay loam, 3 to 10 percent slopes	1, 226	. 4	983	. 4	2, 209
IIIe-30	Upshur silty clay loam, 10 to 20 percent slopes	9, 453	3. 2	2, 706	1. 0	12, 159
VIe-1	Upshur-Muskingum clay loams, 20 to 30 percent slopes, severely eroded	49, 798	16. 8	11, 573	4. 2	61, 371
VIIe-1	Upshur-Muskingum clay loams, 20 to 30 percent slopes, very severely eroded	1, 307	. 4	1, 111	. 4	2, 418

TABLE 7.—*Approximate acreage and proportionate extent of soils in Jackson and Mason Counties, W. Va.*—Continued

Capability unit	Soil	Jackson		Mason		Total
		Acres	*Percent*	*Acres*	*Percent*	*Acres*
VIIe-1	Upshur-Muskingum clay loams, 30 to 40 percent slopes, severely eroded	41, 635	14. 1	7, 407	2. 7	49, 042
VIIe-3	Upshur-Muskingum clay loams, 30 to 40 percent slopes, very severely eroded	2, 078	. 7	1, 422	. 5	3, 500
VIIe-1	Upshur-Muskingum clay loams, 40 to 55 percent slopes, severely eroded	25, 364	8. 6	3, 384	1. 2	28, 748
VIIe-3	Upshur-Muskingum clay loams, 40 to 55 percent slopes, very severely eroded	1, 569	. 5	871	. 3	2, 440
IVe-1	Upshur-Muskingum silty clay loams, 20 to 30 percent slopes	13, 828	4. 7	3, 408	1. 2	17, 236
VIe-1	Upshur-Muskingum silty clay loams, 30 to 40 percent slopes	18, 211	6. 1	2, 984	1. 1	21, 195
VIIe-1	Upshur-Muskingum silty clay loams, 40 to 55 percent slopes	16, 741	5. 6	3, 395	1. 2	20, 136
IVe-1	Vandalia clay loam, 8 to 15 percent slopes, severely eroded	396	. 1	60	(1)	456
VIe-1	Vandalia clay loam, 15 to 25 percent slopes, severely eroded	10, 238	3. 5	1, 434	. 5	11, 672
VIIe-1	Vandalia clay loam, 25 to 35 percent slopes, severely eroded	598	. 2	241	. 1	839
VIIe-1	Vandalia clay loam, 15 to 35 percent slopes, very severely eroded	213	. 1	60	(1)	273
IIe-15	Vandalia silt loam, 3 to 8 percent slopes	19	(1)	161	. 1	180
IIIe-15	Vandalia silt loam, 8 to 15 percent slopes	39	(1)	721	. 3	760
IVe-15	Vandalia silt loam, 15 to 25 percent slopes	29	(1)	1, 354	. 5	1, 383
VIe-3	Vandalia silt loam, 25 to 35 percent slopes			111	(1)	111
IIIe-30	Vandalia silty clay loam, 3 to 8 percent slopes	154	. 1	40	(1)	194
IIIe-30	Vandalia silty clay loam, 8 to 15 percent slopes	451	. 2	60	(1)	511
IVe-1	Vandalia silty clay loam, 15 to 25 percent slopes	1, 424	. 5	291	. 1	1, 715
VIe-1	Vandalia silty clay loam, 15 to 25 percent slopes, severely eroded	287	. 1	5, 364	1. 9	5, 651
VIe-1	Vandalia silty clay loam, 25 to 35 percent slopes	59	(1)	121	(1)	180
VIs-1	Vandalia very stony silt loam, 5 to 15 percent slopes	20	(1)	90	(1)	110
VIIs-1	Vandalia very stony silt loam, 15 to 35 percent slopes	154	. 1	230	. 1	384
IIIe-11	Westmoreland silt loam, 10 to 20 percent slopes	164	. 1	0		164
VIe-1	Westmoreland silt loam, 20 to 30 percent slopes, severely eroded	277	. 1	0		277
VIIe-1	Westmoreland silt loam, 30 to 40 percent slopes, severely eroded	374	. 1			374
VIIe-1	Westmoreland silt loam, 40 to 55 percent slopes, severely eroded	49	(1)	0		49
IIs-2	Wheeling fine sandy loam, 0 to 3 percent slopes	550	. 2	950	. 3	1, 500
IIs-2	Wheeling fine sandy loam, 3 to 8 percent slopes	124	(1)	250	. 1	374
IIIs-1	Wheeling fine sandy loam, 8 to 15 percent slopes	203	. 1	90	(1)	293
IIs-2	Wheeling gravelly sandy loam, coarse subsoil variant, 0 to 3 percent slopes	192	. 1	180	. 1	372
IIs-2	Wheeling gravelly sandy loam, coarse subsoil variant, 3 to 8 percent slopes	77	(1)	150	. 1	227
I-4	Wheeling silt loam, 0 to 3 percent slopes	277	. 1	1, 780	. 6	2, 057
IIe-4	Wheeling silt loam, 3 to 8 percent slopes	77	(1)	431	. 2	508
IIIe-4	Wheeling silt loam, 8 to 15 percent slopes	86	(1)	440	. 2	526
IIe-13	Zoar silt loam, 2 to 6 percent slopes	346	. 1	471	. 2	817
IIIe-13	Zoar silt loam, 6 to 12 percent slopes	48	(1)	50	(1)	98
IVe-9	Zoar silt loam, 6 to 12 percent slopes, severely eroded	39	(1)	30	(1)	69
VIe-2	Zoar silt loam, 12 to 25 percent slopes, severely eroded	19	(1)	180	. 1	199
	Subtotal	292, 832	98. 4	269, 150	97. 3	561, 982
	Miscellaneous (roads, water, etc.)	3, 488	1. 2	7, 330	2. 7	10, 818
	Total	296, 320	100. 0	276, 480	100. 0	572, 800

1 Less than 0.1 percent.

Ashton series

The Ashton series consists of deep, well-drained soils that formed from alluvial deposits on high bottoms or low terraces. The alluvium came from calcareous and from noncalcareous uplands. These soils occur along the Ohio River in Jackson and Mason Counties and along the Kanawha River in Mason County. They are above normal overflow, but areas along the Ohio River were flooded in 1913, 1937, and 1948. The Ashton soils are associated with the Huntington, Lindside, and Melvin soils. They are productive, and a high level of management is justified. Irrigation is practical for truck crops if very high yields are desired.

Profile description of Ashton silt loam, 0 to 3 percent slopes, in Jackson County, 4.2 miles north of Sherman on Route 2:

A_p 0 to 10 inches, dark-brown (10YR 3/3)[5] silt loam with weak, granular structure and weak, subangular blocky structure; friable to firm; pH 6.2; abrupt, wavy boundary.

B_{21} 10 to 22 inches, dark-brown (7.5YR 4/4), heavy silt loam; dark yellowish-brown (10YR 3/4) silt flow from A_p horizon on ped faces; moderate, medium, subangular blocky structure; firm; pH 5.4; gradual, wavy boundary.

B_{22} 22 to 38 inches, dark-brown (7.5YR 4/4), light silt loam; dark-brown (10YR 4/3) continuous clay coats on ped faces; weak, medium, subangular blocky structure; friable; pH 5.4; gradual, wavy boundary.

C 38 inches, dark-brown (10YR 4/3) to dark yellowish-brown (10YR 4/4), light silt loam to very fine sandy loam (variable); structureless; very friable to loose; pH 5.4; some fine lenses and layers of sand.

Range in characteristics: The texture is predominantly silt loam, but it ranges from fine sandy loam to silty clay loam. Ashton soils with a silty clay loam texture show more profile development than those with coarser texture. Along the Ohio River, the Ashton soils are closely associated with the Huntington soils.

5 Symbols express Munsell color notations.

Drainage: Well drained to somewhat excessively drained.

Permeability: Moderate to rapid.

Position and slope: High first bottoms that for the most part are level or gently sloping; areas normally quite long and narrow (200 to 300 feet in width).

Ashton silt loam, 0 to 3 percent slopes (AsA).—This soil has the profile described as representative of the series. It is the most extensive of the Ashton soils. It is suited to intensive cropping. A row crop can be grown every year if followed by a cover crop, and if the soil is adequately limed and fertilized and organic matter is maintained. Also suitable is a row crop followed by small grain and hay. Capability unit I–6.

Ashton silt loam, 3 to 8 percent slopes (AsB).—This gently sloping soil occurs mainly in long, narrow areas that are subject to slight sheet erosion. It requires contour farming and longer rotations than Ashton silt loam, 0 to 3 percent slopes. A row crop followed by a small grain and by 2 years of hay can be used. Capability unit IIe–6; soil limited by slight erosion hazard.

Ashton silt loam, 8 to 15 percent slopes (AsC).—This soil occurs on breaks between two topographic levels. In places the subsoil is slightly coarser and more open than that described in the representative profile. Long rotations are needed in most places. Areas of this soil are narrow, however, and are managed like the nearby level areas. Capability unit IIIe–6; soil limited by moderate erosion hazard.

Ashton fine sandy loam, 0 to 3 percent slopes (AfA).—This soil has a coarser surface soil and subsoil than those described in the representative profile. A row crop can be grown every year if it is followed by a cover crop. Also suitable is a row crop followed by a small grain the second year and by hay the third. Heavy fertilization, however, is needed to maintain yields. Practices that build up the organic matter in this soil are needed. Capability unit IIs–6; soil limited by droughtiness.

Ashton fine sandy loam, 3 to 8 percent slopes (AfB).—This soil has a very small acreage. Most areas have gentle slopes, but some with strong slopes are included. This soil occurs in long and very narrow tracts and is farmed with other soils in the same field. Some small areas with a sandy loam surface soil are included. A row crop followed by small grain and 2 to 3 years of hay will help build up organic matter and maintain fertility. Capability unit IIs–6; soil limited by droughtiness.

Brooke series

The Brooke soils are moderately deep and are well drained, but they have a sticky surface soil and a slowly permeable, clayey subsoil. They have developed from thin-bedded limestone and some calcareous gray shale. They occur only in the northeastern part of Jackson County and are on the narrow, rounded ridges and low saddles. They are associated with the Westmoreland soils and with the soils of the Upshur-Muskingum complex. The Brooke soils are excellent for bluegrass pasture and are used to a limited extent for general farming.

Profile description of Brooke clay loam, 6 to 12 percent slopes, severely eroded, in Jackson County on a ridge 2 miles northwest of Medina:

A_p 0 to 5 inches, dark-gray (10YR 4/1) clay loam; weak, granular and weak, fine, subangular blocky structure; very friable; pH 6.8; abrupt boundary.

B_{21} 5 to 13 inches, yellowish-brown (10YR 5/4 and 5/8) silty clay with some dark-gray (10YR 4/1) stains and brown (10YR 5/3) clay coatings; moderate, fine, blocky structure; a few manganese coatings; friable to firm; pH 6.8; clear boundary.

B_{22} 13 to 26 inches, yellowish-brown (10YR 5/4) clay with light olive-brown (2.5Y 5/4) clay coatings and a few gray (2.5Y 5/0) mottles and thin streaks; very sticky when wet; strong, fine and medium, blocky structure; firm; pH 7.5; gradual boundary.

C 26 to 35 inches, yellowish-brown (10YR 5/8), strong-brown (7.5YR 5/8), grayish-brown (2.5Y 5/2), and gray (2.5Y 5/0) clay; massive; not as sticky as the B_{22} horizon; firm; a few weathered shale chips; pH 7.5; gradual, irregular boundary.

D 35 inches +, grayish-brown (2.5Y 5/2) and light olive-brown (2.5Y 5/4), weathered clay shale that is harder with depth and effervesces at 40 inches; underlain by limestone and limy red shale.

Range in characteristics: The depth of these soils to shale ranges from 24 to 36 inches. A few loose limestone rocks are scattered over the surface in places. There are some limestone ledges. The color of the surface soil ranges from dark gray to brown, and locally, its texture ranges from heavy silt loam to silty clay.

Drainage: Well drained. Internal drainage is slow. Runoff is moderate to rapid.

Permeability: Moderately slow to slow.

Position and slope: Hilltops, benches near the top of slopes, narrow ridges, and saddles. Most areas strongly sloping.

Brooke clay loam, 6 to 12 percent slopes, severely eroded (BcC3).—This soil has the profile described as representative of the series. The clay loam plow layer is difficult to cultivate. Slopes are moderate and runoff is excessive. Long-term hay and an occasional row crop do well on this soil. Small areas of Brooke soils with gentle slopes and a silty clay loam surface layer are included with this soil. Capability unit IVe–1; soil limited by severe erosion hazard.

Brooke clay loam, 12 to 25 percent slopes, severely eroded (BcD3).—This soil has a profile similar to the one described for the Brooke series. It has a clay loam surface soil as a result of severe sheet erosion. It is strongly sloping and difficult to cultivate because of the heavy texture of the surface layer. Runoff is excessive. Permanent pasture or woods is needed to maintain this soil. Capability unit VIe–1; soil limited by moderately steep slopes, severe erosion, and heavy surface layer.

Chilo series

The Chilo series consists of deep, very poorly drained soils on terraces. These soils have developed in glacial outwash material carried by the Ohio River. They are underlain by sand and gravel. Chilo soils are the very poorly drained members of the Wheeling-Sciotoville-Ginat-Chilo catena. Chilo soils occur only in Mason County. All are in slightly depressed or ponded areas below Lakin loamy fine sand and have some overwash from the Lakin soils.

Profile description of Chilo sandy loam in Mason County:

A_0 ¾ to 0 inch, partly decomposed, dense mat of grass and sedge.

A_1 0 to 10 inches, very dark gray (10YR 3/1) sandy loam with common, fine, rust spots of strong brown (7.5YR 5/8); weak, medium, granular structure; very friable; full of roots and relatively high in organic matter; pH 5.0; clear, wavy boundary.

A_3 10 to 13 inches, dark-brown (10YR 3/3) sandy loam with few, fine, rust spots of strong brown (7.5YR 5/8); weak, fine, subangular blocky structure; very friable; pH 5.0; clear, wavy boundary.

B_{21} 13 to 22 inches, dark grayish-brown (10YR 4/2) sandy clay loam; common, medium mottles of gray (10YR 6/1) and strong brown (7.5YR 5/8); weak, medium, subangular blocky structure; firm when dry, plastic when moist; pH 5.0; gradual boundary.

B_{22} 22 to 37 inches, gray (10YR 6/1) sandy clay; common, medium mottles of strong brown (7.5YR 5/8); massive, but some weak, coarse, and medium, subangular blocky breakage; firm when dry, plastic when moist, and slightly sticky when wet; few sedge roots; pH 5.2; clear, wavy boundary.

D 37 to 48 inches +, gray (10YR 6/1) and yellowish-brown (10YR 5/4), stratified loamy sand, fine sandy loam, and sand; pH 5.2 at 40 inches.

Range in characteristics: The Chilo soils vary most widely in the amount of sandy overwash material that came from the Lakin soils. The depth of the profile to the sandy clay loam B horizon ranges from 12 to 20 inches. Areas range from slightly depressed to definitely ponded.

Drainage: Poorly drained to very poorly drained. Surface drainage is poor to ponded.

Permeability: Slow; varies somewhat according to the amount of sand in B horizons.

Position and slope: In depressions adjacent to large areas of Lakin loamy fine sand.

Chilo sandy loam, 0 to 3 percent slopes (ChA).—This soil has the profile described as representative of the series. Much of it is in ponded areas or swales. This soil needs drainage before it can be cropped, but lack of outlets may prevent drainage. Moderate yields can be expected on drained areas. Rotations lasting 3 or 4 years are needed. Capability unit IIIw–1; soil limited by excess wetness.

Duncannon series

The Duncannon series are deep, well-drained soils that developed on silty deposits presumably laid down by wind. These soils generally occur on the hillsides and gentle slopes along the eastern side of the valley of the Ohio River. They occur also in hummocky deposits that overlie water-deposited terraces. They are associated with the soils of the Lakin series, which consist of windblown deposits of fine sand, and with the soils of the Muskingum-Upshur complex.

Profile description of Duncannon silt loam, 8 to 15 percent slopes, in Mason County:

A_1 0 to 2 inches, dark grayish-brown (10YR 4/2) silt loam with weak, fine, granular structure; very friable; pH 5.2; clear, wavy boundary.

A_2 2 to 8 inches, yellowish-brown (10YR 5/4) silt loam with weak, thin, platy structure; very friable; pH 5.0; abrupt, wavy boundary.

B_{21} 8 to 16 inches, yellowish-brown (10YR 5/6), heavy silt loam with strong-brown (7.5YR 5/6) clay films on ped faces; weak to moderate, fine and medium, subangular blocky structure; friable to firm; pH 5.5; clear, wavy boundary.

B_{22} 16 to 32 inches, yellowish-brown (10YR 5/6) silt loam with dark-brown (7.5YR 4/4) clay films on ped faces; moderate, medium to coarse, subangular blocky structure; friable to firm; gradual, wavy boundary; few fine manganese concretions and streaks; pH 5.0.

C 32 to 80 inches, silt loam splotched with yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6); massive, breaking to very weak, coarse, subangular blocky structure; friable; pH 5.0.

Range in characteristics: The texture of the entire profile ranges from silt loam to silty clay loam. The total depth of the silty layer over residual material ranges from about 36 inches to many feet. There is a gradual decrease in depth of the silty layer with increasing distance from the Ohio River. Usually, these soils grade into the Muskingum-Upshur complex.

Drainage: Well drained.

Permeability: Moderate.

Position and slope: On the hills facing the river and on nearby hilltops; slopes range from 3 to 40 percent but average about 20 percent.

Duncannon silt loam, 3 to 8 percent slopes (DuB).—Rotations that include 1 or 2 years of hay are needed to control runoff and erosion. Needed amounts of fertilizer and lime can be determined by soil tests. A small total acreage that is nearly level has been included with this soil. These nearly level areas may show some faint mottling in the lower subsoil. Capability unit IIe–4; soil slightly limited by slope and erosion hazard.

Duncannon silt loam, 8 to 15 percent slopes (DuC).—This soil has the profile described as representative of the series. It is moderately sloping, and erosion is a hazard in cultivated areas. Rotations that include 2 years or more of hay are suitable. Contour cultivation or stripcropping is needed. Capability unit IIIe–4; soil limited by slope and moderate erosion hazard.

Duncannon silt loam, 8 to 15 percent slopes, severely eroded (DuC3).—In places this soil is only moderately deep and has a redder subsoil than typical of the series. Because of severe erosion that has removed much of the original surface soil, this soil should be kept in permanent hay or pasture. Row crops should be grown only occasionally. Adequate fertilization and liming are necessary. Capability unit IVe–3; soil limited by severe erosion and by slope.

Duncannon silt loam, 15 to 25 percent slopes (DuD).—This soil occurs in small, scattered areas. Long-term hay, followed occasionally by a row crop or pasture, is suitable. Capability unit IVe–3; soil limited by strong slope.

Duncannon silt loam, 15 to 25 percent slopes, severely eroded (DuD3).—This soil has a redder subsoil than that typical of the series, and in some places it is only moderately deep. Erosion has removed most of the original surface soil. This soil is best suited to permanent pasture. Well-managed pasture sods are needed to prevent further erosion. Capability unit VIe–2; soil limited by erosion hazard.

Duncannon silt loam, 25 to 40 percent slopes (DuE).—This steep soil occurs in small, scattered areas. In places the wind-deposited material is shallow over upland residual material. Most areas are forested but are often used with adjacent pastures. Capability unit VIIe–2; soil too steep for crops or pasture but suitable as woodland.

Duncannon silt loam, 25 to 40 percent slopes, severely eroded (DuE3).—This steep soil has lost much of the original surface soil through erosion. Some shallow spots and some areas of the Muskingum-Upshur complex are included with this soil. Areas not forested should be planted to suitable species. Capability unit VIIe–2; soil too steep and eroded for crops or hay but is suitable as woodland.

Ginat series

The Ginat series consists of deep, poorly drained soils on terraces. These soils have developed on glacial outwash material carried by the Ohio River and underlain by glacial sand and gravel. Ginat soils are the poorly drained members of the Wheeling-Sciotoville-Ginat-Chilo drainage catena. They occur in Jackson and Mason Counties in narrow, low areas or swales.

Profile description of Ginat silt loam, 0 to 3 percent slopes, in Mason County, along Route 2, three-fourths of a mile south of Hogsett:

A_p 0 to 8 inches, dark-gray (10YR 4/1) silt loam; weak, fine, granular and weak, fine, subangular blocky structure; friable; pH 5.2; abrupt, smooth boundary.

B_{21g} 8 to 22 inches, gray (10YR 5/1 to 6/1), heavy silt loam; few, fine, yellowish-brown (10YR 5/6) mottles; weak, fine and medium, subangular blocky structure; friable; pH 5.0; clear, wavy boundary.

B_{22g} 22 to 34 inches, gray (10YR 6/1) silty clay loam; common, medium, yellowish-brown (10YR 5/8) mottles; moderate, medium and coarse, subangular blocky structure; friable; pH 5.0; clear, wavy boundary.

D 34 inches +, gray (10YR 5/1), stratified fine silt and sand; pH 5.0; underlain by deep gravel and sand at depths of 20 feet or more.

Range in characteristics: The variations are chiefly in the thickness of the horizons and in the color of the A_p horizon (10YR 4/1 to 10YR 3/2). Depth of solum to fine silt and sand ranges from 30 to 80 inches. Runoff ranges from fair to poor, and to very poor in a few depressed areas.

Drainage: Poorly drained.

Permeability: Very slow.

Position and slope: Level or depressed areas; most areas are long and narrow, 100 to 200 feet wide, and lie parallel to the Ohio River; areas mainly east of the Baltimore and Ohio Railroad, quite a distance from the river.

Ginat silt loam, 0 to 3 percent slopes (GsA).—This soil has the profile described as representative of the series. Many areas are drained and farmed along with better drained soils. Moderate yields can be expected from drained areas. Drainage is fairly successful if outlets can be found. Rotations that include 2 or more years of hay will help maintain organic matter and structure. A few very small areas of dark-surfaced, very poorly drained Chilo soils are included with this soil. Capability unit IIIw–1; use of soil limited by wetness.

Hackers series

The Hackers series consists of deep, well-drained, reddish soils on high bottoms along the larger streams. These streams drain uplands occupied by soils of the Upshur-Muskingum and Muskingum-Upshur complexes. The Hackers soils occur with Moshannon, Senecaville, and Vandalia soils. They are widely distributed in small areas throughout Jackson and Mason Counties, although the total acreage is not large.

Profile description of Hackers silt loam, 0 to 3 percent slopes, in Jackson County, 3.6 miles north of Ripley:

A_p 0 to 10 inches, dark reddish-brown (5YR 3/4) silt loam; weak, fine and medium, granular structure; friable; pH 5.6; clear, wavy boundary.

B_{21} 10 to 28 inches, yellowish-red (5YR 4/8), light silty clay loam with reddish-brown (5YR 5/3) coatings; moderate, medium, subangular blocky structure; firm; pH 5.4; clear boundary.

B_{22} 28 to 60 inches, reddish-brown (2.5YR 4/4), light silty clay loam with weak-red (2.5YR 4/2) coatings; moderate, medium, subangular blocky structure; firm; pH 5.4; gradual boundary.

B_3 60 to 72 inches, reddish-brown (5YR 4/4), heavy silt loam with weak-red (2.5YR 4/2) coatings; weak, medium and coarse, subangular blocky structure; friable; pH 5.4; clear boundary.

C 72 inches +, reddish-brown (5YR 4/4) fine sand with some clayey lenses; some gravel; variable in texture.

Range in characteristics: The texture is predominantly silt loam, but the range includes fine sandy loam and loam.

Drainage: Well drained.

Permeability: Moderate.

Position and slope: Level to gently sloping, smooth, high bottoms that are free from flooding except during the highest floods.

Hackers silt loam, 0 to 3 percent slopes (HaA).—This soil has the profile described as representative of the series. It is almost all cleared and under cultivation. Good management practices will maintain this soil. All local crops are grown. A few areas of this soil have some faint mottling. Capability unit I–6.

Hackers silt loam, 3 to 8 percent slopes (HaB).—This soil occurs on gentle breaks from the creeks to the hilly land. Areas ordinarily are narrow and are farmed along with areas of the level Hackers soil. Some areas have a somewhat coarser subsoil than that described in the representative profile. Simple conservation practices that will control washing are beneficial. Capability unit IIe–6; use of soil slightly limited by slope and hazard of erosion.

Holston series

The Holston series consists of moderately deep to deep, well-drained soils on terraces. These soils have developed in alluvial material derived from acid sandstone and shale. They are associated with the Monongahela, Tyler, and Purdy soils. They are mostly on high terraces (Upper Flats) in the northern part of Mason County and in a similar area in Jackson County. These somewhat poorly defined high terraces consist of moderately thin (4 to 10 feet) deposits over sandstone or red shale. The Holston soils are largely remnants, and in places they are only 24 inches deep over red shale or over residual material derived from red shale and sandstone. Since these soils have a very silty surface soil and are east of the Ohio River, they probably contain some wind-transported material.

Profile description of Holston silt loam, 8 to 15 percent slopes, in Jackson County, 4 miles south of Ravenswood:

A_p 0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam with weak, fine, subangular blocky structure; loose; pH 6.2; clear, wavy boundary.

B_{21} 7 to 12 inches, strong-brown (7.5YR 5/6) silt loam with dark grayish-brown (10YR 4/2) stain from the A_p horizon; moderate, medium and coarse, subangular blocky structure; friable; pH 5.4; clear, wavy boundary.

B_{22} 12 to 20 inches, strong-brown (7.5YR 5/6), heavy silt loam with strong-brown (10YR 5/6) clay coats on ped faces; moderate, fine and medium, subangular blocky structure; firm; pH 5.2; clear boundary.

B_{23} 20 to 26 inches, strong-brown (7.5YR 5/6) silt loam with yellowish-brown and pale-brown (10YR 5/6 and 6/3) clay coats on ped faces; moderate, fine, subangular blocky structure; friable; pH 5.2.

D_u 26 inches, reddish-brown (2.5YR 4/4) clay; sticky and plastic when wet; clay derived from red, limy shale of the Dunkard geologic series.

Range in characteristics: The surface soil is predominantly a silt loam, but it ranges from silt loam to fine sandy loam. The depth of the solum to red clay or sandstone ranges from 24 inches to 4 or 5 feet. Most of the Holston soils, however, are more than 36 inches deep. A few pebbles occur throughout the profile. In some places the color of the B horizon ranges from yellowish brown (10YR 5/4–5/8) to strong brown (7.5YR 5/6–5/8). In some small areas on the terraces of present streams, the B horizon is less strongly expressed than in areas on the older, higher terraces.

Drainage: Well drained.

Permeability: Moderate.

Position and slope: Moderately sloping to strongly sloping old stream terraces; most of the terraces are high.

Holston silt loam, 8 to 15 percent slopes (HoC).—This soil has the profile described as representative of the series. It is suited to rotations that include 2 or more years of hay. It is almost all cleared and under cultivation. Natural fertility is moderate. Capability unit IIIe–4; soil limited by slope and moderate hazard of erosion.

Holston silt loam, 8 to 15 percent slopes, severely eroded (HoC3).—Because of erosion, this soil has a shallower surface soil than the one described in the representative profile. Rotations that include 3 or more years of hay are suitable. Permanent pasture is also suitable. Very limited use of tilled crops is advisable. Capability unit IVe–3; use of soil limited by slope and severe erosion.

Holston silt loam, 15 to 25 percent slopes (HoD).—The profile of this soil is slightly shallower than the representative profile. Individual areas are small. Rotations having 3 or more years of hay are suitable, or the soil can be kept in hay continuously. Capability unit IVe–3; soil limited by slope and severe erosion hazard.

Holston silt loam, 15 to 25 percent slopes, severely eroded (HoD3).—The profile of this soil is shallower but is otherwise similar to the one described for the series. Erosion has removed most of the original surface soil. This soil occurs mostly on narrow slopes between two level areas. It is best suited to permanent pasture. Capability unit VIe–2; soil limited by severe erosion and slope.

Huntington series

The Huntington series consists of deep, well-drained soils on first bottoms. These soils have developed in recent alluvium derived from a mixture of limestone, limy shale, and some acid sandstone and shale. They are along the Ohio River in both Jackson and Mason Counties and along the Kanawha River in Mason County. They occur with the Ashton, Lindside, and Melvin soils. The Huntington soils occur mainly in two level areas. A very narrow band of these soils (50 to 100 feet wide) occurs near the Ohio and Kanawha Rivers and is flooded several times a year. The main body of Huntington soils occurs 25 to 35 feet above ordinary flood level and is flooded on an average of about once in 5 years. Floods usually occur in winter or very early in spring. These soils have more evidence of profile development and are less subject to floods than many soils on the first bottoms along smaller streams.

Representative profile of Huntington silt loam, 0 to 3 percent slopes, along the Ohio River, 1½ miles north of Point Pleasant:

A_p 0 to 11 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; very friable when moist; pH 6.5; clear, smooth boundary.

C_1 11 to 20 inches, dark-brown (10YR 4/3) silt loam; weak, medium, subangular blocky structure; firm when moist; pH 6.6; clear, smooth boundary.

C_2 20 to 35 inches, dark-brown (10YR 4/3) silt loam with coatings of dark brown (10YR 3/3); weak and moderate, medium, subangular blocky structure; friable; pH 6.6; gradual, smooth boundary.

C_3 35 to 47 inches, dark yellowish-brown (10YR 4/4), heavy silt loam with coatings of dark brown (10YR 3/3); moderate, medium and coarse, subangular blocky structure; slightly firm; pH 6.2; gradual, wavy boundary.

C_4 47 to 57 inches, dark-brown (10YR 4/4) silt loam with dark-brown (10YR 3/3) coatings; weak, coarse and medium, subangular blocky structure; slightly firm when moist; pH 5.9; gradual, wavy boundary.

C_5 57 to 102 inches +, dark yellowish-brown (10YR 3/4) silt loam, sandy loam, and loamy sand in bands and layers; structureless.

Range in characteristics: Silt loam is the predominant texture, but some areas are loam or fine sandy loam. Profile development is very weak to moderate. In some places characteristics of Huntington soils approach those of the Ashton soils.

Drainage: Well drained.

Permeability: Moderate.

Position and slope: Level first bottoms; slopes are narrow and steeper where these soils merge with those at higher levels.

Huntington fine sandy loam, 0 to 5 percent slopes (HfA).—This soil has a profile similar to the one described except for texture. The texture of the surface soil and subsoil is fine sandy loam. This soil ranges from slightly droughty to droughty. All of it is cleared, and it is farmed along with Huntington silt loam, 0 to 3 percent slopes. Management practices to increase the organic matter and water-holding capacity are needed. Small areas with a sandy loam texture are included. Capability unit IIs–6; use of soil limited by droughtiness.

Huntington silt loam, 0 to 3 percent slopes (HuA).—This soil has the profile described as representative of the series. All areas except streambanks are cultivated or pastured. This soil has high natural productivity and is suited to all locally grown crops, especially corn. The high natural fertility justifies a very high level of management, including large applications of fertilizer for high production. Lime needs should be determined by tests. Capability unit I–6; soil has no limitations except occasional flood hazard.

Lakin series

The Lakin series consists of deep, coarse-textured, excessively drained soils that occur east of the Ohio River in Jackson and Mason Counties. These soils have developed from sandy windblown or water-laid material that came from the Ohio River flood plain. They occur (1) on irregular or hummocky deposits, (2) on smooth, water-laid terraces, and (3) as a thick mantle against the hillsides along the eastern edge of the valley. They are associated with the Duncannon soils, which presumably developed from windblown material, and with the Wheeling soils on the terraces.

Two soil types are mapped—Lakin loamy fine sand and Lakin loamy sand. The areas of Lakin loamy sands occur in level or gently sloping positions similar to those in which the Wheeling soils occur. Apparently they were deposited by water. Their profile is very similar to that of the windblown Lakin loamy fine sands but is coarser textured.

Profile description of Lakin loamy fine sand, 8 to 15 percent slopes, in Jackson County, 5 miles south of Ravenswood along Route 2:

A_p 0 to 8 inches, dark-brown (10YR 3/3) loamy fine sand; weak, fine, granular structure; very friable; pH 5.1; abrupt, smooth boundary.

A_2 8 to 12 inches, yellowish-brown (10YR 5/4) loamy fine sand; weak, fine, granular and weak, thin, platy structure; friable; pH 5.4; clear, wavy boundary.

A_3 12 to 17 inches, yellowish-brown (10YR 5/4) loamy fine sand; contains dark-brown (7.5YR 4/4), firm lumps, one-fourth inch in diameter, that break easily to weak, fine, granular structure; rest of horizon is single grain; very friable; pH 5.4; clear, wavy boundary.

B_2 17 to 31 inches, strong-brown (7.5YR 5/6) to yellowish-brown (10YR 5/6) loamy fine sand; somewhat firm, coarse, subangular, dark-brown (7.5YR 4/4) lumps are common; lumps break to weak, fine, granular structure; rest of horizon is single grain; very friable; few, fine, soft manganese or iron concretions; pH 5.7; gradual, wavy boundary.

B_3 31 to 41 inches, yellowish-brown (10YR 5/4) fine sand; commonly contains dark-brown (7.5YR 3/4), irregular bands, 1 to 2 inches thick, of fine sandy loam to loamy fine sand; single grain; loose; few, small manganese coatings; gradual, wavy boundary.

C 41 to 60 inches +, yellowish-brown (10YR 5/4) fine sand with dark-brown (10YR 4/3), irregular bands, 1 to 2 inches thick, and firm, massive lumps, 1 to 2 inches in diameter, of fine sandy loam or loamy fine sand; loose; pH 5.4.

Range in characteristics: The thickness of the windblown material ranges from 5 to 40 feet.

Drainage: Excessive.

Permeability: Rapid.

Position and slope: Gently sloping to steep areas and dunelike deposits along the east side of the Ohio River.

Lakin loamy fine sand, 3 to 8 percent slopes (LaB).—This soil is generally smooth or undulating. It is droughty, but less so than the other Lakin soils, and it is low in organic matter. Nearly all areas are cultivated. Only moderate yields can be expected. Rotations that include at least 2 years of hay are suitable. Many areas of this soil are next to the Wheeling soils. Capability unit IIIs-1; soil limited by droughtiness.

Lakin loamy fine sand, 8 to 15 percent slopes (LaC).—This soil has the profile described as representative of the series. Runoff is medium. Rotations that include 3 or more years of hay are suitable. Capability unit IVs-1; soil limited by droughtiness and erosion hazard.

Lakin loamy fine sand, 15 to 25 percent slopes (LaD).—This soil lies on thicker dunelike deposits than Lakin loamy fine sand, 8 to 15 percent slopes. The deposits are 20 to 30 feet deep in places. This soil is very droughty. Cleared areas should be planted to suitable kinds of trees and protected from fire and grazing. Capability unit VIIs-2; soil limited by droughtiness and erosion hazard.

Lakin loamy fine sand, 25 to 40 percent slopes (LaE).—In many places this soil consists of remnants of deposits on steep upland slopes. The total depth is only 4 to 5 feet in places. Cleared areas should be planted to suitable kinds of trees and protected from fire and grazing. Capability unit VIIs-2; soil limited by steepness of slope and droughtiness.

Lakin loamy fine sand, 25 to 40 percent slopes, severely eroded (LaE3).—This soil is similar to Lakin loamy fine sand, 25 to 40 percent slopes, except that it has been severely eroded and much of its surface soil has been lost. Cleared areas should be planted to suitable kinds of trees. Capability unit VIIs-2; soil use limited by erosion, steepness, and droughtiness.

Lakin loamy sand, 0 to 3 percent slopes (LkA).—This nearly level soil has a coarser textured profile than the one described for the series. Rotations that include 2 or more years of hay are suitable. Much of this soil is used for urban development. Capability unit IIIs-1; soil use limited by droughtiness.

Lakin loamy sand, 3 to 8 percent slopes (LkB).—This soil occurs on narrow, long ridges and is more variable than Lakin loamy sand, 0 to 3 percent slopes. It contains layers of sand and gravel. Runoff is slight. Rotations that include 2 or more years of hay are suitable. Small areas of Lakin soils with a fine sandy loam texture are included with this soil as mapped. Capability unit IIIs-1; soil use limited by droughtiness.

Lindside series

The Lindside series consists of deep, moderately well drained to somewhat poorly drained soils of first bottoms. They are associated with soils of the Ashton, Huntington, and Melvin series. They are on first bottoms with Huntington soils and on high first bottoms with Ashton soils. Consequently, they are flooded about once in 5 years on the first bottoms and about once in 10 to 15 years on the high first bottoms. These soils have developed in acid to neutral alluvium derived from residual soils that vary widely. They occur very commonly in depressions surrounded by the Huntington and Ashton soils. The Lindside soils make up a large total acreage along the Ohio River in Mason and Jackson Counties and along the Kanawha River in Mason County.

Profile description of Lindside silt loam, 0 to 3 percent slopes, in Mason County, three-fourths of a mile east of Point Pleasant, along Route 35:

A_p 0 to 11 inches, dark-brown (10YR 3/3) silt loam; granular structure and weak, fine, subangular blocky structure; very friable; pH 5.4; abrupt, smooth boundary.

C_1 11 to 20 inches, dark yellowish-brown (10YR 4/4) silt loam; dark-brown (10YR 3/3) stains on ped faces; weak, fine and medium, subangular blocky structure; friable; pH 5.2; gradual, wavy boundary.

C_2 20 to 42 inches, dark-brown (7.5YR 4/4), heavy silt loam; common, fine mottles of grayish brown (10YR 5/2); coatings on ped faces; moderate, coarse, subangular blocky structure; firm; common manganese concretions and coatings that increase with depth; pH 5.2; gradual, wavy boundary.

C_3 42 to 60 inches, dark-brown (7.5YR 4/4) silty clay loam; many, medium mottles of light brownish gray (10YR 6/2); grayish-brown (10YR 5/2) coatings on ped faces; many manganese concretions; pH 5.0.

Range in characteristics: The depth to mottling ranges from about 18 to 30 inches. Small areas of fine sandy loam occur and are within the texture range of this series. Some areas along the Kanawha River have a silty clay loam texture and show stronger development in the lower layers than is typical of the series.

Drainage: Moderately well drained to somewhat poorly drained.

Permeability: Moderately slow.

Position and slope: On first bottoms and on high first bottoms; level or slightly depressed; many areas are long and narrow (200 feet wide) and are between or surrounded by areas of Ashton or Huntington soils.

Lindside silt loam, 0 to 3 percent slopes (LsA).—This soil has the profile described as representative of the series. Rotations that include at least 2 years of hay are suitable. This soil has high productivity and moisture capacity, but its use is slightly limited by slow internal drainage. Tile drainage has been practiced successfully. Almost all areas are cultivated or pastured. Most crops suited to the area are grown. Alfalfa may be damaged in winter. Capability unit IIw–7; use of soil and choice of crops slightly limited by wetness.

Markland series

The Markland series consists of deep, moderately well drained soils. These soils have developed from alkaline slack-water materials on terraces. These materials were deposited by glacier-blocked streams. The Markland soils occur in small areas along all of the side streams and adjacent to the Ohio and Kanawha Rivers in Jackson and Mason Counties. Most of these soils appear to be small remnants of old, larger terraces.

Some areas of Markland soils are mapped with the McGary soils as undifferentiated units. These units of Markland and McGary soils are usually gently sloping and occur next to the steeper areas of Markland soils. They have many slopes that are slightly concave. Normally, small spots of the more poorly drained McGary soils are in slightly more nearly level or depressed areas surrounded by Markland soils. A representative profile of the McGary soils is described for the McGary series.

Profile description of Markland silt loam, 6 to 12 percent slopes, in Mason County, 2 miles east of Mercers Bottom along the county road:

A_p 0 to 8 inches, grayish-brown (10YR 5/2) silt loam; weak, fine, granular structure; friable to slightly firm; pH 7.3; abrupt, smooth boundary.

A_3 8 to 12 inches, light olive-brown (2.5Y 5/4) silty clay loam; moderate, medium, subangular blocky structure; light yellowish-brown (10YR 6/4) clay coats on ped faces; slightly firm; pH 4.9; clear, wavy boundary.

B_1 12 to 16 inches, yellowish-brown (10YR 5/6) silty clay; a few, fine mottles of strong brown (7.5YR 5/8) and grayish brown (10YR 5/2) in lower part of horizon; moderate, medium and coarse, subangular blocky structure; firm; pH 5.2; abrupt, wavy boundary.

B_{21} 16 to 25 inches, yellowish-brown (10YR 5/6) silty clay; mottles of strong brown (7.5YR 5/6) and grayish brown (10YR 5/2); weakly developed, very coarse prisms; firm when moist and plastic when wet; pH 5.4; gradual, wavy boundary.

B_{22} 25 to 33 inches, yellowish-brown (10YR 5/6) clay; mottles of strong brown (7.5YR 5/6) and grayish brown (10YR 5/2); massive structure with weakly developed coarse prisms; brown (10YR 5/3) clay films on ped faces; firm when moist and plastic when wet; few calcium carbonate and manganese concretions; pH 6.2.

C_{ca} 33 to 50 inches, olive-brown (2.5Y 4/4) clay weakly mottled as in layer above; massive with coarse, weak polygons coated with black manganese films and heavy clay flows; firm when moist and somewhat plastic when wet; numerous calcium carbonate concretions and manganese concretions; pH 7.6.

Range in characteristics: The surface layer is silt loam except where it has been altered by erosion. In these eroded areas it is silty clay loam. In some places the color of the B horizon ranges from yellowish brown to strong brown. Depth to mottling ranges from 14 to 22 inches. Many small areas along Oldtown Creek in Mason County and Mill Creek in Jackson County are 20 to 30 feet or more thick. Other areas are only 10 to 15 feet deep.

Drainage: Moderately well drained to somewhat poorly drained.

Permeability: Slow to very slow.

Position and slope: Level to gently sloping terraces with narrow, steep edges.

Markland silt loam, 6 to 12 percent slopes (MaC).—This soil has the profile described as representative of the series. Rotations that include 3 years or more of hay are suitable. Some small, poorly drained areas are included with this mapping unit. Capability unit IIIe–14; soil limited by severe erosion hazard and slope.

Markland silty clay loam, 6 to 12 percent slopes, severely eroded (MbC3).—This soil has a profile similar to the one described, but it has a finer textured surface layer because most of the original surface soil has been removed by erosion. Long-term hay is suited to this soil. Tilled crops, however, can be grown once in a 5- or 6-year rotation if stripcropping and other suitable conservation practices are used. Capability unit IVe–9; soil limited by severe erosion and slope.

Markland silty clay loam, 12 to 25 percent slopes, severely eroded (MbD3).—This soil occurs in small tracts. It is slightly better drained than Markland silt loam, 6 to 12 percent slopes. Mottling occurs mostly at depths of 20 to 22 inches. Erosion has removed most of the original surface soil. A few small areas with very severe erosion and steeper slopes are included with this unit. This soil is best suited to permanent pasture. Capability unit VIe–1; soil limited by slope and severe erosion.

Markland and McGary silt loams, 2 to 6 percent slopes (McB).—Most areas of this unit consist of approximately half McGary and half Markland soils. Drainage is slow or slightly ponded on much of this unit. The soil may be difficult to drain because of its depressed position. Capability unit IIIw–5; limited by wetness.

Markland and McGary silty clay loams, 2 to 6 percent slopes, severely eroded (MdB3).—This unit generally has less McGary soil than Markland and McGary silt loams, 2 to 6 percent slopes. It has better surface drainage. Erosion has removed enough of the surface soil so that the plow layer is now silty clay loam. These soils are difficult to plow and erode readily. Runoff is rapid in many places. Conservation practices are needed. Capability until IVe-9; limited largely by erosion and severe erosion hazard.

McGary series

The McGary series consists of deep, somewhat poorly to poorly drained soils. These soils have developed in the same kind of material as the soils of the Markland series. They have slow runoff or are slightly ponded because of their low positions. In Jackson and Mason Counties, the McGary soils are mapped only as undifferentiated units with the Markland soils. The Markland soils occurring in these units are described for the Markland series.

Profile description of McGary silt loam, 3 percent slopes:

A_p 0 to 7 inches, grayish-brown (2.5Y 5/2), heavy silt loam, medium, granular structure; pH 5.6; clear boundary.

B_{21g} 7 to 16 inches, light yellowish-brown (2.5Y 6/4) silty clay; many, medium mottles of light gray (2.5Y 7/1) and strong brown (7.5YR 5/6); very firm when moist, slightly sticky and plastic when wet; faint, discontinuous clay films; pH 5.6; gradual, wavy boundary.

B_{22g} 16 to 28 inches, light yellowish-brown (2.5Y 6/4) silty clay or clay; some gray (2.5Y 6/0) clay faces; common, medium mottles of strong brown (7.5YR 5/6); very firm (firmer than B_{21g} horizon); pH 5.6; gradual boundary.

C_1 28 to 48 inches +, dark yellowish-brown (10YR 4/4) clay with coats of gray (5Y 6/0) and many streaks and mottles of gray (2.5Y 7/0) and light yellowish brown (2.5Y 6/4); weak, coarse and very coarse, blocky structure; very firm; pH 5.8 at 28 inches, becomes calcareous at about 40 inches.

Range in characteristics: The subsoil of the McGary soils ranges from silty clay to clay.

Drainage: Somewhat poorly to poorly drained.

Permeability: Slow to very slow.

Position and slope: Gently sloping concave slopes or slight depressions in terrace areas.

Melvin series

The soils of the Melvin series are deep and are poorly drained to very poorly drained. They have developed in alluvial material that washed from uplands underlain by acid and lime-influenced shale and sandstone. They have also developed in alluvium that washed from uplands underlain by sandstone and shale and red limy shale. These soils occur both on the first bottoms and on the high bottoms along the Ohio and Kanawha Rivers. They also occur along the smaller streams in the two counties. They are flooded once in about 5 years to once in about 10 to 15 years. Some small areas are flooded once every 2 to 3 years. The Melvin soils are associated with the Ashton, Huntington, and Lindside soils and with the Moshannon and Senecaville soils.

Profile description of Melvin silt loam, 0 to 3 percent slopes, in Mason County, along the Ohio River, 2 miles south of Graham Station and east of U.S. Route 33:

A_p 0 to 9 inches, very dark grayish-brown (10YR 3/2) silt loam; a few, fine mottles of gray (10YR 5/1); granular structure; friable; pH 5.2; clear, smooth boundary.

B_{21} 9 to 15 inches, dark yellowish-brown (10YR 4/4), heavy silt loam with gray (10YR 5/1), common, medium mottles and a few, fine, yellowish-red (5YR 5/6) spots; moderate, coarse, subangular blocky structure; firm; pH 5.5; gradual, wavy boundary.

B_{22g} 15 to 29 inches, gray (10YR 6/1) silty clay loam with common, yellowish-red (5YR 5/6) spots; moderate, coarse, subangular blocky structure; coatings on ped faces; very firm; many manganese concretions that in places occur in clusters up to three-fourths of an inch in diameter; pH 5.5; gradual, wavy boundary.

C 29 to 36 inches +, gray (10YR 6/1) silty clay loam; many, coarse, mottles of yellowish brown (10YR 5/6) and yellowish red (5YR 5/6); weak, coarse, subangular blocky structure; coatings on ped faces; very firm; many manganese concretions occurring singly and in clusters; pH 5.6.

Range in characteristics: In most places the texture of the surface soil is silt loam or silty clay loam. The texture of the subsoil ranges from silty clay loam to clay. Melvin soils mapped along the Kanawha and Ohio Rivers have dominant colors of 10YR hue. Along other streams in Jackson and Mason Counties the soils may be of 7.5YR or 5YR hues.

Drainage: Poorly drained.

Permeability: Moderately slow to very slow.

Position and slope: Level or depressed areas on first bottoms and high first bottoms of small streams and rivers; many areas are old, abandoned stream channels.

Melvin silt loam, 0 to 3 percent slopes (MeA).—This soil has the profile described as representative of the series. It needs drainage before it can be used for crops. All locally grown crops are suitable on drained areas. Rotations that include at least 2 years of hay should be used to maintain organic matter and structure of the soil. Alfalfa is not well suited to this soil. Tall-grass pasture is well suited. Capability unit IIIw-1; soil limited by wetness.

Melvin silty clay loam, 0 to 3 percent slopes (MfA).—The profile of this soil differs from the one described in having finer texture in the surface soil. In addition, the texture of the subsoil is finer than typical of the series; in many places it is silty clay or clay. This soil has slower permeability than Melvin silt loam, 0 to 3 percent slopes, and is more difficult to drain successfully. It must be drained before it can be used for crops or pasture. Because of the heavy texture of the subsoil, open drains are most practical. Sizable areas of this soil are in brush or small trees. Runoff is very poor or ponded on these areas. Smooth surfaces are needed to improve poor surface drainage. Capability unit IVw-1; soil limited by extreme wetness and heavy subsoil.

Monongahela series

The soils of the Monongahela series are moderately well drained and have a fragipan. They have developed on old high terraces from old alluvium from acid sandstone and shale. They occur with the Holston, Zoar, Tyler, and Purdy soils. Monongahela soils are mainly on the terraces in the northern part of Jackson and Mason Counties. The terrace is not well defined in many places. Monongahela soils also occur on terraces along some of the present streams.

Profile description of Monongahela silt loam, 0 to 2 percent slopes, in Mason County, 3 miles east of Point Pleasant:

A_p 0 to 8 inches, dark-brown (10YR 4/3) silt loam; weak, fine, subangular blocky structure; very friable when moist; pH 6.9; abrupt, smooth boundary.

A_2 8 to 10½ inches, light olive-brown (2.5Y 5/6) silt loam; very weak, thin, platy structure; friable when moist; contains many fine roots and many coarse pores; pH 6.9; clear, wavy boundary.

B_2 10½ to 20 inches, yellowish-brown (10YR 5/6) silt loam; clay films and fine pores are common; weak, medium, subangular blocky structure; friable to somewhat firm; pH 4.6; clear, wavy boundary.

B_3 20 to 28 inches, silt loam of splotched or mottled yellowish brown (10YR 5/8 and 10YR 5/4); prominent clay skins of dark yellowish brown (10YR 4/4); moderate, coarse, platy structure, breaking to moderate, fine, platy peds; clay skins are prominent on both coarse and fine peds; firm when moist; few manganese concretions; pH 5.1; clear, wavy boundary.

B_{31gm} 28 to 41 inches, fragipan of fine silt loam strongly mottled with yellowish brown (10YR 5/8) and pale brown (10YR 6/3); strong, thick, platy structure breaking to medium, subangular blocky peds; peds are arranged as coarse prisms and polygons and have very prominent gray (10YR 5/1) clay flows; hard when dry, firm to very firm when moist; pH 5.3; diffuse boundary.

B_{32gm} 41 to 52 inches, similar to the B_{31gm} horizon but there is an increase in clay so that texture is silty clay loam; manganese films and concretions common throughout the fragipan horizon; pH 5.4.

D 52 inches +, heavy silty clay loam; base color is yellowish brown (10YR 5/8) with brown (10YR 5/3) faces; many, medium, distinct mottles of gray (10YR 6/1); clay skins are prominent; weak, coarse, subangular blocky structure breaking to moderate, medium, subangular blocky peds; some evidence of coarse polygons; pH 5.2.

Range in characteristics: This soil is predominantly silt loam. In some areas it ranges from loam to fine sandy loam. The floury silt loam surface layer of some areas indicates the presence of some windblown silt. Depth to mottling ranges from about 16 to 24 inches. Gravel of various sizes occurs in places throughout the profile. The substratum ranges from silty clay on high terraces to sandy or gravelly material on terraces above present streams. The depth of these soils ranges from 5 to 10 feet. The Monongahela soils are underlain by calcareous slack-water clays in some places and by an acid sandy substratum in others. Areas along small streams where the texture of the B horizons is less strongly expressed have a thinner profile than described.

Drainage: Moderately well drained.

Permeability: Slow.

Position and slope: Old high terraces and some normal terraces that are nearly level or gently sloping.

Monongahela silt loam, 0 to 2 percent slopes (MgA).—This soil has the profile described as representative of the series. Small, poorly drained spots occur in places. Runoff is medium to poor. Alfalfa may winterkill on this soil. Capability unit IIw–1; soil limited by moderate wetness.

Monongahela silt loam, 2 to 6 percent slopes (MgB).—This soil has a profile similar to that described as representative of the series. It has better surface drainage than Monongahela silt loam, 0 to 2 percent slopes. Alfalfa does better on this soil. Runoff is medium. Capability unit IIe–13; soil limited by moderate risk of erosion and drainage problems.

Monongahela silt loam, 6 to 12 percent slopes (MgC).—This soil has a profile similar to the one described, but the total depth is shallower in places. It is better drained than Monongahela silt loam, 0 to 2 percent slopes. Slopes are smooth and runoff is rapid. Long rotations are needed. Capability unit IIIe–13; soil limited by moderate erosion hazard.

Monongahela silt loam, 6 to 12 percent slopes, severely eroded (MgC3).—Erosion has removed about three-fourths of the original surface soil from this strongly sloping soil. Drainage is slightly better than typical of the series, and runoff is rapid. Long-term hay or pasture is suited. Sheet erosion, rather than gullying, occurs. Capability unit IVe–9; soil limited by past erosion and severe erosion hazard.

Moshannon series

The Moshannon series consists of deep, well-drained soils on first bottoms. These soils have developed from alluvial material from Upshur soils and from soils of the Upshur-Muskingum and Muskingum-Upshur complexes. This series is the well-drained member of the Moshannon-Senecaville-Melvin catena. The Moshannon soils occur in rather narrow areas along almost all the smaller streams in Jackson and Mason Counties. They are widely distributed in the two counties. Floods vary considerably in frequency. In most areas they occur once in 2 to 3 years and limit the use of tilled crops.

Profile description of Moshannon silt loam, 0 to 3 percent slopes, in Jackson County, 5 miles east of Sherman:

A_p 0 to 8 inches, dark-brown (7.5YR 3/2) silt loam; weak, fine, granular structure; very friable; pH 6.4; gradual, wavy boundary.

C_1 8 to 42 inches, dark-brown (7.5YR 4/4), light silty clay loam with dark grayish-brown (10YR 4/2) coatings; weak, medium, subangular blocky structure; friable; pH 6.0; clear, wavy boundary.

C_2 42 inches +, stratified fine sand, silt, and some gravel; pH 5.8.

Range in characteristics: The texture of the surface soil ranges from silt loam to fine sandy loam but is silt loam in most areas. The texture of the C_1 horizon ranges from fine sandy loam to silty clay loam. On the larger bottoms, these soils have a profile that is largely free from shale fragments and shows some evidence of a B horizon. On the many areas on small, narrow stream bottoms, the profile contains as much as 20 percent shale and sandstone fragments and lacks evident horizons. In places thin, sandy layers occur throughout the profile. The depth of the Moshannon soils to bedrock ranges from 36 inches on the narrow bottoms to 8 to 10 feet on the larger bottoms.

Drainage: Well drained.

Permeability: Moderate.

Position and slope: Level to strongly sloping first bottoms.

Moshannon silt loam, 0 to 3 percent slopes (MoA).—This soil has the profile described as representative of the series. It occurs along all streams except the Ohio and Kanawha Rivers. Long rotations that include a row crop, small grain, and hay or permanent hay or pasture are suitable. Where there is no overflow hazard, corn followed by a cover crop can be grown each year. Capability unit IIw–6; soil limited by overflow hazard.

Moshannon silt loam, 3 to 8 percent slopes (MoB).—This soil is similar to Moshannon silt loam, 0 to 3 percent slopes, except for steeper slopes and more runoff. Small areas are managed with adjacent soils. This unit includes alluvial fans of considerable size that typically have numerous coarse fragments. The gently sloping bottoms occupied by this soil usually have less serious floods. Rotations that include 2 or 3 years of hay are suitable. Capability unit IIe–6; soil limited by erosion hazard.

Moshannon silt loam, 8 to 15 percent slopes (MoC).—This unit includes all the alluvial fans with moderate slopes and varying amounts of gravel and shale chips throughout the profile. Rotations that include grain, followed by 3 years of hay, or permanent hay, are suitable. Capability unit IIIe–6; soil limited by moderate erosion hazard.

Muskingum series

The Muskingum series consists of shallow to moderately deep, well-drained soils on the slopes and ridges of Jackson and Mason Counties. They have developed from interbedded sandstone and siltstone of the Dunkard and Monongahela geologic series. They occur in association and in complexes with the Upshur soils. They also occur next to the Tilsit and Wharton soils on ridgetops and narrow breaks. They occupy mostly small areas in the southern parts of these two counties.

Profile description of Muskingum silt loam, 20 to 30 percent slopes, in Jackson County, 3.2 miles east of Kenna on Fisher Ridge Road:

A_p 0 to 2 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, granular structure; friable; pH 5.8; abrupt, wavy boundary.

A_2 2 to 3½ inches, yellowish-brown (10YR 5/4) silt loam; weak, fine, subangular structure; firm; pH 5.7; discontinuous boundary.

B_2 3½ to 8 inches, yellowish-brown (10YR 5/6) silt loam; weak to moderate, medium and coarse, subangular blocky structure; yellowish-brown (10YR 5/4), distinct but discontinuous clay coats; firm; 2 percent soft sandstone fragments; pH 4.8; clear, wavy boundary.

B_3 8 to 11 inches, yellowish-brown (10YR 5/8) sandy loam; weak, medium, subangular blocky structure; a few brown (10YR 5/3) clay coats; friable; pH 4.9; clear, wavy boundary.

C 11 to 24 inches, yellowish-brown (10YR 5/8) sandy loam; massive; friable; 10 to 15 percent small sandstone fragments; pH 4.9.

D_r 24 inches +, coarse-grained, soft, micaceous sandstone.

Range in characteristics: Profile development of these soils, as they occur in Jackson and Mason Counties, ranges from weak to moderate. Parent material ranges from all sandstone to sandstone and siltstone with some influence from red clay shale. The texture of the B horizon ranges from sandy loam to silty clay loam. In some areas, depth to bedrock ranges from 16 to 30 inches within short distances. The color of the subsoil ranges from yellowish brown to strong brown.

Drainage: Well drained.

Permeability: Moderate to somewhat rapid.

Position and slope: Muskingum soils in small areas on ridgetops or on slopes; areas of the Muskingum-Upshur complexes on landscape characterized by benches; slopes generally somewhat rounded; many convex slopes.

Muskingum sandy loam, 10 to 20 percent slopes (MsC).—The profile of this soil differs from the one described in having coarser texture in the surface soil and subsoil. Small areas have bedrock within 10 to 14 inches. This soil is more droughty than Muskingum silt loam, 20 to 30 percent slopes. Rotations that include 2 to 3 years of hay are suitable. Permanent hay is also suitable. Capability unit IIIe–12; soil limited by moderate erosion hazard.

Muskingum sandy loam, 20 to 30 percent slopes (MsD).—This soil has a coarser textured surface soil and subsoil than described in the representative profile. It is more droughty than the soil for which the profile was given. A few sandstone ledges occur. Rotations that include 3 years of hay are suited to this soil. Permanent hay is also suited. Capability unit IVe–3; soil limited by slope and erosion hazard.

Muskingum sandy loam, 20 to 30 percent slopes, severely eroded (MsD3).—This unit is similar to Muskingum sandy loam, 20 to 30 percent slopes, except that surface erosion has removed more than three-fourths of the original surface soil. A few shallow gullies occur. This soil is best suited to permanent pasture. Proper stocking and management is essential to prevent further erosion. Capability unit VIe–2; soil limited by erosion and slope.

Muskingum sandy loam, 30 to 55 percent slopes (MsF).—The profile of this soil is coarser textured and shallower than the one described. In addition, this soil is more droughty than the soil described by the representative profile. Occasional rocks and ledges occur. Individual areas are small. This unit is steep to very steep. Cleared areas should be planted to suitable tree species, and existing woods should be improved. Capability unit VIIe–2; soil limited to woodland by steep to very steep slopes.

Muskingum sandy loam, 30 to 55 percent slopes, severely eroded (MsF3).—This unit is similar to Muskingum sandy loam, 30 to 55 percent slopes, except that erosion has removed about three-fourths of the original surface soil. Some rocks and ledges occur. A few shallow gullies occur. Capability unit VIIe–2; soil limited to woodland by severe erosion and steep to very steep slopes.

Muskingum silt loam, 3 to 10 percent slopes (MtB).—The profile of this gently sloping soil is slightly deeper than the one described and shows more development. In some areas it is shallow to flat-bedded sandstone. This soil is suited to general farm crops. It is slightly droughty. Rotations that include 2 or more years of hay are suitable. Capability unit IIe–10; soil limited by slight erosion hazard.

Muskingum silt loam, 10 to 20 percent slopes (MtC).—This strongly sloping soil is suited to rotations that include 2 or more years of hay. Contour stripcropping should be used with tilled crops. Capability unit IIIe–10; soil limited by moderate erosion hazard.

Muskingum silt loam, 20 to 30 percent slopes (MtD).—This soil has the profile described as representative of the series. Rotations that include at least 4 years of hay are suitable for this soil if contour strips are used. Permanent hay is also suitable. Capability unit IVe–3; soil limited by severe erosion hazard and slope.

Muskingum silt loam, 20 to 30 percent slopes, severely eroded (MtD3).—The profile of this soil is similar to the one described, but erosion has removed most of the original surface soil. Shallow areas occur. In some areas the profile is finer textured and redder than the one described. Capability unit VIe–2; soil limited by erosion and severe erosion hazard.

Muskingum silt loam, 30 to 40 percent slopes (MtE).—The profile of this soil is shallower and contains more stone than the one described. Small, severely eroded spots occur. Suitable tree species should be planted, and present stands should be improved. Protection from fire and grazing is needed. Capability unit VIIe–2; soil limited to woodland by steep slopes and erosion hazard.

Muskingum-Upshur complexes

In some areas the Muskingum soils occur in an intricate pattern with the Upshur soils. It was not practical to map or manage the soils in these areas separately. They were therefore mapped together as a complex. The soils in such areas were formerly known as the Meigs soils.

Areas where the Muskingum soils are dominant were mapped as Muskingum-Upshur complexes. The Muskingum soils generally make up 50 to 60 percent of the acreage. However, the relative proportion of the component soils varies. The Upshur soils are described under the Upshur series.

Muskingum-Upshur soils have mostly strongly sloping to steep and very steep slopes. On the steeper slopes some narrow banding of the two soils occurs.

The Muskingum-Upshur soils occur on rocks of the Monongahela geologic series and to a small extent on the Dunkard geologic series. These geologic series are characterized by alternating strata of sandstone and red clay shale. Since the sandstone is more resistant than the shale, benches are formed. Benches and much dissection are characteristic of the landscape on which the Muskingum-Upshur soils occur. The ridge crests in this area are all at about the same elevation (800 to 900 feet). The major streams occur at about 500 to 600 feet. The drainageways reach almost to the ridgetops.

These complexes of soils make up about a third of the total land area of Jackson and Mason Counties. They occupy nearly all of Mason County south of the Kanawha River and nearly all of the southeastern tip of Jackson County. Smaller areas occur elsewhere in both counties.

Muskingum-Upshur silt loams, 3 to 10 percent slopes (MuB).—The Muskingum soil makes up about 60 percent of this unit. Slopes are relatively free of benches. Row crops can be grown in rotations that include 2 or more years of hay. Capability unit IIe–15; limited by moderate erosion hazard.

Muskingum-Upshur silt loams, 3 to 10 percent slopes, severely eroded (MuB3).—This complex of soils is similar to the one on 3 to 10 percent slopes, but erosion has removed most of the surface soil. Small areas may have a silty clay loam surface layer. Small gullies occur. These soils are suitable for crops if long rotations and conservation practices are used. Capability unit IIIe–15; limited by erosion and severe erosion hazard.

Muskingum-Upshur silt loams, 10 to 20 percent slopes (MuC).—Muskingum soil occupies about 60 to 70 percent of this mapping unit. Slopes are somewhat bench shaped. Occasional sandstone ledges occur. Most of this land is being used for pasture or cropland. Rotations that include 2 or more years of hay are suitable. Carefully applied conservation practices are necessary. Capability unit IIIe–15; limited by severe erosion hazard.

Muskingum-Upshur silt loams, 10 to 20 percent slopes, severely eroded (MuC3).—This mapping unit is similar to Muskingum-Upshur silt loams, 10 to 20 percent slopes, except that erosion has removed most of the surface soil. It has a slightly larger percentage of Upshur soil than typical of the Muskingum-Upshur complex. There are some areas with silty clay loam surface soil. Long-term hay is suitable. Capability unit IVe–15; limited by severe erosion.

Muskingum-Upshur silt loams, 10 to 20 percent slopes, very severely eroded (MuC4).—This mapping unit occurs in small, individual areas. It has a larger percentage of Upshur soil than typical for this complex. Erosion has removed all of the original surface soil, and there are numerous gullies. Revegetation by grasses or legumes or by shrubs and trees is needed. Capability unit VIIe–3; limited by severe erosion.

Muskingum-Upshur silt loams, 20 to 30 percent slopes (MuD).—The Muskingum soil makes up about a half to two-thirds of this complex of soils. Numerous benches occur. Small, severely eroded areas are included. Some small areas of Vandalia silt loam are also included. Most areas of this unit have been cleared and are being farmed. Capability unit IVe–15; limited to long-term hay by severe erosion hazard.

Muskingum-Upshur silt loams, 20 to 30 percent slopes, severely eroded (MuD3).—This mapping unit contains a larger percentage of Upshur soils than typical of the Muskingum-Upshur complex. Erosion has removed most of the surface soil, and in some areas the texture of the surface layer is silty clay loam or clay loam. This unit has the characteristic bench-shaped slopes. Some landslips occur. Gullies are common but are usually not very deep. Pasture, if carefully managed, is suitable for this unit. Capability unit VIe–3; limited by severe erosion and slope.

Muskingum-Upshur silt loams, 30 to 40 percent slopes (MuE).—This complex of soils has many benches and some very steep slopes. Muskingum soil makes up about 50 to 75 percent of it. Use of machinery is difficult on much of this area. Permanent pasture is suitable where lime and fertilizer can be applied. Capability unit VIe–3; limited by severe erosion hazard and steep slopes.

Muskingum-Upshur silt loams, 30 to 40 percent slopes, severely eroded (MuE3).—This mapping unit is similar to Muskingum-Upshur silt loams, 30 to 40 percent slopes. Erosion, however, has removed most of the surface soil, especially from the Upshur component. Gullies are numerous in places, and landslips occur. Steep and very steep slopes occur between benches on this unit. Capability unit VIIe–1; limited to woodland by severe erosion and steep slopes.

Muskingum-Upshur silt loams, 40 to 55 percent slopes (MuF).—This complex of soils has benches as well as irregular, steep and very steep slopes, many of which are just above the streams. Muskingum soils make up about three-quarters of the unit. Most areas are shallow or moderately deep. A large part of this unit is in woodland. Capability unit VIIe–1; limited to woodland by very steep slopes.

Muskingum-Upshur silt loams, 40 to 55 percent slopes, severely eroded (MuF3).—This mapping unit is very similar to Muskingum-Upshur silt loam, 40 to 55 percent slopes, but it has a slightly larger percentage of Upshur soil. Erosion has removed about three-fourths of the original surface soil. In places the Upshur component has a silty clay or clay loam surface soil. Much of this complex of soils that was in pasture has been allowed to grow up in woods. Capability unit VIIe–1; limited to woodland by very steep slopes and severe erosion.

Muskingum-Upshur very stony loams, 30 to 40 percent slopes (MvE).—This complex of soils occurs in small individual areas along with Upshur-Muskingum soils as well as other Muskingum-Upshur soils. Massive sandstone ledges and some loose surface stones make up most of the stony part of this unit. The Upshur and Muskingum soils occur between the ledges. Capability unit VIIs–1; limited to woodland by stoniness.

Muskingum-Upshur very stony loams, 40 to 55 percent slopes (MvF).—Areas of this mapping unit are rough and precipitous and in many places are immediately above streams. Massive sandstone ledges and loose stones make these soils stony. In most places the soils are shallow. A very large percentage of this mapping unit is Muskingum soil. Most of the acreage is in woods, and much of it has never been cleared. Capability unit VIIs–1; limited to woodland by stoniness and very steep slopes.

Muskingum-Upshur very stony loams, 30 to 55 percent slopes, severely eroded (MvF3).—This unit is similar to Muskingum-Upshur very stony loams, 40 to 55 percent slopes, except that it contains fewer steep areas. In addition, it has fewer stones and ledges than the uneroded units on similar slopes, but it contains a slightly larger percentage of Upshur soil. Erosion has removed most of the original surface soil. Much of the erosion is the result of farming and pasturing these very steep slopes. Most of this complex of soils is being allowed to grow up in woods. Capability unit VIIs–1; limited by stoniness and very steep slopes.

Purdy series

The Purdy series consists of deep, poorly drained soils on slack-water deposits. These soils have developed in fine-textured alluvial material from acid sandstone and shale. They are associated with the Holston, Monongahela, and Tyler soils.

Profile description of Purdy silt loam, 0 to 4 percent slopes, in Mason County:

A_p 0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam with few fine spots of yellowish brown (10YR 5/6); weak, granular to fine, subangular blocky structure; friable; pH 6.0; abrupt, wavy boundary.

B_{21g} 8 to 20 inches, gray (10YR 6/1) silty clay loam; yellowish-brown (10YR 5/6 and 5/8), common, medium mottles; moderate, fine and medium, subangular blocky structure; firm; pH 5.0; clear, wavy boundary.

B_{22g} 20 to 28 inches, gray (10YR 5/1) silty clay; many, medium, yellowish-brown (10YR 5/6) mottles; moderate, medium and coarse, subangular blocky structure; firm; pH 5.2; clear, wavy boundary.

C 28 inches +, gray (10YR 5/1) silty clay; massive; firm; pH 5.2.

Range in characteristics: The texture of the surface soil ranges from silt loam to silty clay loam but is mostly silt loam. The texture of the B horizon ranges from silty clay loam to clay. In places the underlying strata is sandstone and shale from a depth of 6 feet or more. Some areas are underlain at 40 inches or more by alkaline slack-water clay.

Drainage: Poorly drained.

Permeability: Slow to very slow.

Position and slope: Level to slightly depressed areas on present stream terraces or on old high terraces.

Purdy silt loam, 0 to 4 percent slopes (PuA).—This soil has the profile described as representative of the series. Its poor drainage and low productivity limit its use to hay in long rotations or to pasture. Tile drainage of this soil, except on small seep spots, is not usually very successful. Low to moderate yields can be expected. Capability unit IVw–1; soil limited by wetness.

Sciotoville series

The Sciotoville series consists of deep, moderately well drained soils on terraces. These soils have developed from glacial outwash material carried by the Ohio River. They are underlain by glacial sand and gravel. They are associated with the Wheeling, Ginat, and Chilo soils. The Sciotoville soils occur along the Ohio River in Jackson and Mason Counties, mostly as narrow bands paralleling the river.

Profile description of Sciotoville silt loam, 0 to 3 percent slopes, in Jackson County, one-half a mile north of Mill Creek:

A_1 0 to 3 inches dark-brown (10YR 3/3) silt loam; weak fine, granular structure; very friable; pH 5.0; clear boundary.

A_2 3 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, subangular blocky structure; friable; pH 5.0; clear boundary.

B_{21} 7 to 17 inches, dark yellowish-brown (10YR 4/4), heavy silt loam; moderate, fine, subangular blocky structure; friable; pH 5.0; clear boundary.

B_{22} 17 to 23 inches, dark yellowish-brown (10YR 4/4) silty clay loam; few, fine mottles of dark brown (7.5YR 4/4); massive, breaking to moderate, medium, subangular blocky structure; pH 5.0; firm, gradual boundary.

B_3 23 to 40 inches, dark yellowish-brown (10YR 4/4) silty clay loam; common, medium mottles of dark brown (7.5YR 4/4); moderate, medium, subangular blocky structure; firm, becoming friable with depth; pH 6.0; gradual boundary.

D 40 inches +, stratified sandy loam and sand.

Range in characteristics: In some areas the texture of the surface soil ranges from silt loam to fine sandy loam, and that of the subsoil from fine sandy loam to silty clay loam. Some areas have a windblown, floury silt loam surface soil. Depth to the sandy D layer ranges from about 34 to 48 inches. The usual depth to mottling is 18 to 24 inches, but in places it may be 30 inches.

Drainage: Moderately well drained.

Permeability: Moderately slow.

Position and slope: Level or gently sloping areas on terraces on which Wheeling soils occur; in places areas are slightly depressed.

Sciotoville silt loam, 0 to 3 percent slopes (ScA).—This soil has the profile described as representative of the series. Rotations that include at least 2 years of hay are suitable. Complete drainage is not usually practical on this soil, except on small seep spots. Capability unit IIw–1; soil limited by slight wetness.

Sciotoville silt loam, 3 to 8 percent slopes (ScB).—This gently sloping soil has better runoff than Sciotoville silt loam, 0 to 3 percent slopes. Erosion is a slight hazard in places. Rotations that include 2 or more years of hay, or permanent hay, are suitable. Capability unit IIe–13; soil limited by slight erosion hazard and slight wetness.

Senecaville series

The Senecaville series consists of deep, moderately well drained soils on flood plains. These soils have developed from alluvial material washed from uplands that are underlain by alkaline and limy, red and gray shale and some sandstone. They are the moderately well drained members of the Moshannon-Senecaville-Melvin catena. They occur very commonly on the upland side of the Moshannon soils and are mapped along all of the streams in Mason and Jackson Counties except the Ohio and Kanawha Rivers. Many areas are long and narrow.

Profile description of Senecaville silt loam, 0 to 3 percent slopes, in Jackson County, along Nesselroad Run, 1 mile west of U.S. Route 21:

A_p 0 to 7 inches, dark reddish-brown (5YR 3/4) silt loam; weak, fine, granular and weak, fine, subangular blocky structure; very friable; pH 5.8; clear, wavy boundary.

C_1 7 to 18 inches, reddish-brown (5YR 4/4) silty clay loam; dark reddish-gray (5YR 4/2) coatings and stains on ped faces; weak, medium, subangular blocky structure; friable; pH 5.4; clear, wavy boundary.

C_{2g} 18 to 34 inches, reddish-brown (5YR 4/4) silty clay loam; common, medium mottles of yellowish red (5YR 4/6) and light reddish brown (5YR 6/3); mottling intensity increases with depth; weak, fine and medium, subangular blocky structure; firm; many manganese concretions and coatings; pH 5.4; clear, wavy boundary.

C_3 34 inches +, reddish-brown (5YR 4/4) and yellowish-red (5YR 4/8), stratified silt and sand.

Range in characteristics: The texture of the surface soil ranges from fine sandy loam to silty clay loam but is predominantly silt loam. The texture of the lower layers ranges from fine sandy loam to silty clay loam. Depth to mottling ranges from 16 to 26 inches.

Drainage: Moderately well drained.

Permeability: Moderately slow.

Position and slope: Level or slightly depressed areas parallel to the stream and next to the upland.

Senecaville silt loam, 0 to 3 percent slopes (SeA).—This soil has the profile described as representative of the series. Areas mapped on high first bottoms show more profile development than those mapped on normal first bottoms. The reddish color is stronger and textures are somewhat heavier in areas along streams that drain the Upshur-Muskingum soils than in areas along streams that drain the Muskingum-Upshur soils. Sandy lenses may occur throughout the profile. Floods occur about every other year on the very low bottoms to about once in 10 years on the high bottoms. Rotations are governed by the hazard of flooding. They vary from a row crop every year followed by a cover crop to long rotations or pasture. Tile drainage is usually successful. Diversion terraces are needed in places to intercept water from upper slopes. Capability unit IIw–7; soil limited by wetness; flood danger limits some local areas.

Sloping land, alluvial materials

Sloping land, alluvial materials (So).—This miscellaneous land type occurs within areas of Wheeling, Monongahela, Tyler, Markland, Lakin, and Zoar soils on terraces. It also occurs within areas of Ashton, Hackers, and Huntington soils on first bottoms and high first bottoms. It is on short slopes between terrace levels and between terraces and flood plains. It is also on short slopes between the different levels of flood plains and between flood plains and stream channels.

Areas of this miscellaneous land type range from strongly sloping to very steep. They have textures closely related to the soil adjoining the slopes on which they occur. Textures range from loamy sand near the Lakin soils to silty clay loam or silty clay near the Markland soils. The degree of erosion varies, but most areas have been moderately eroded. Some slopes have been severely eroded.

This miscellaneous land type has not been classified as to capability. It ranges from class IV to class VII in use suitability. A fairly large part is in class VI. The very short slopes that make up this land type are either farmed with adjoining slopes or kept in permanent pasture or woods. Permanent pasture or woods are the most suitable uses. Management, including conservation practices, are similar to those of the adjoining soils. This miscellaneous land type is not listed in most of the major tables.

Tilsit series

The soils of the Tilsit series in Jackson and Mason Counties are mapped only in undifferentiated units with the Wharton soils. They occur on level to gently sloping ridgetops, mostly in the southern parts of these counties. They are adjacent to the Muskingum-Upshur and Upshur-Muskingum complexes of soils, which are on stronger slopes. The Tilsit soils have developed from acid gray sandstone and siltstone. They are medium textured and have a fragipan. Most areas are yellowish brown and are usually underlain by sandstone. Because of their occurrence and characteristics, Tilsit soils are best managed with Wharton soils. A profile of a representative Tilsit soil follows. See the description of the Wharton series for a representative Wharton soil.

Profile description of Tilsit silt loam, 0 to 3 percent slopes:

A_1 0 to 2 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, subangular blocky structure; friable; pH 5.2; clear, wavy boundary.

A_2 2 to 8 inches, brown (10YR 5/3) silt loam; weak, fine, subangular blocky structure; friable; pH 4.8; clear, wavy boundary.

B_{21} 8 to 14 inches, yellowish-brown (10YR 5/6) silt loam; moderate, medium, subangular blocky structure; firm; pH 4.4; gradual, wavy boundary.

B_{22} 14 to 22 inches, yellowish-brown (10YR 5/6) silt loam; moderate, coarse, subangular blocky structure; firm; a few manganese concretions; pH 4.4; gradual, wavy boundary.

B_{23m} 22 to 40 inches, yellowish-brown (10YR 5/6) silty clay loam; fragipan with gray (10YR 6/1), common, medium mottles; moderate, thin, platy structure; very firm; pH 4.4; gradual, wavy boundary.

D_r 40 inches +, sandstone and shale; somewhat soft and weathered on top.

Range in characteristics: The fragipan occurs at depths ranging from 20 to 26 inches. Depth to mottling ranges from 16 to 24 inches. Some areas near the Ohio River have a very silty surface layer suggesting windblown origin.

Drainage: Moderately well drained.

Permeability: Moderately slow to slow.

Position and slope: Level to gently sloping ridgetops.

Tilsit and Wharton silt loams, 0 to 3 percent slopes (TwA).—Most of this unit contains a slightly larger percentage of the Tilsit than of the Wharton soil. It includes small wet spots. Rotations that include 2 or more years of hay are suitable. Almost all of this unit has been cleared. Capability unit IIw–1; limited by slight wetness.

Tilsit and Wharton silt loams, 3 to 8 percent slopes (TwB).—Surface drainage is better than for Tilsit and Wharton silt loams, 0 to 3 percent slopes. Depth to mottling or to the fragipan is slightly greater. More reddish hues and more red shale occur. Erosion hazard caused by runoff is a definite problem. Rotations that include 2 or more years of hay are suited, and simple conservation measures are needed. Capability unit IIe–13; limited by moderate erosion hazard and by heavy clay or fragipan layers in the subsoil.

Tyler series

The soils of the Tyler series are deep and somewhat poorly drained. These soils have developed from acid alluvium deposited on old, high preglacial terraces and along present streams. They occur with the Holston, Monongahela, Zoar, and Purdy soils.

Profile description of Tyler silt loam, 0 to 2 percent slopes, in Jackson County, one-half mile north of Evans:

A_1 0 to 3 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, fine, granular structure; friable; pH 5.0; clear, wavy boundary.

B_1 3 to 10 inches, yellowish-brown (10YR 5/6) silty clay loam; weak, fine, subangular blocky structure; firm; pH 5.0; clear, wavy boundary.

B_{21} 10 to 14 inches, yellowish-brown (10YR 5/8) silty clay loam; moderate, medium, subangular blocky structure; very firm; pH 5.0; gradual, wavy boundary.

B_{22g} 14 to 19 inches, grayish-brown (2.5Y 5/2) silty clay; common, medium mottles of yellowish brown (10YR 5/8); strong, coarse, subangular blocky structure; very firm; pH 5.0; gradual, wavy boundary.

C 19 to 42 inches, gray (5Y 6/1) silty clay; many, coarse mottles of yellowish brown (10YR 5/8); massive structure; very firm; pH 5.5.

D_u 42 inches +, alkaline slack-water material on terraces; similar to the deep subsoil horizons of the Markland soils.

Range in characteristics: The texture of the surface soil ranges from silt loam to silty clay loam. The texture of the B horizon ranges from silty clay loam to clay. The depth to underlying material varies somewhat. In two of the largest areas mapped, the soils have developed in deposits 3 to 5 feet deep over calcareous, slack-water materials. This underlying material has a pH of 7.0+, which is reflected in the somewhat higher pH of the lower C horizon. In places the underlying material on terraces along present streams is sandy and acid.

Drainage: Somewhat poorly drained.

Permeability: Slow.

Topography: Level or gently sloping terraces.

Tyler silt loam, 0 to 2 percent slopes (TyA).—This soil has the profile described as representative of the series. Surface drainage is fair or poor, and wet spots are common. Rotations that include 2 or more years of hay are suitable. Drainage is needed to grow cultivated crops. Capability unit IIIw–5; soil limited by excess wetness.

Tyler silt loam, 2 to 6 percent slopes (TyB).—This gently sloping soil usually occurs along the sides of small drainageways that run through the terrace flats. Surface drainage is better than on Tyler silt loam, 0 to 2 percent slopes. Long-term hay or rotations that include 2 or more years of hay are suited. Capability unit IIIw–5; soil limited by excess wetness.

Upshur series

The Upshur series consists of deep, well-drained, reddish soils on the uplands. They have developed from alkaline or calcareous red clay shale. They have a very heavy, plastic, sticky subsoil. These soils occur on ridges and low saddles and on benches and are nearly level to strongly sloping. They are mainly in eastern Mason and northern Jackson Counties but occur throughout both counties. These soils occur extensively on the smoother slopes. Many areas are complexes with Muskingum soils. Erosion is generally severe. Landslips are common. Most areas have been cleared, but tillage is difficult on these heavy soils. Unimproved roads and farm roads through these soils are very poor when wet, and many of them are impassable in winter.

Profile description of a typical Upshur clay loam, 3 to 10 percent slopes, severely eroded, 3 miles south of Mount Alto:

A_p 0 to 7 inches, dark reddish-brown (5YR 3/3) clay loam to silty clay; moderate, fine, granular structure; firm when moist and slightly sticky when wet; pH 4.7.

B_{21} 7 to 13 inches, reddish-brown (2.5YR 4/4) clay coated with reddish brown (5YR 4/3); strong, fine and medium, blocky structure; firm when moist and plastic and sticky when wet; prominent and continuous clay coats; pH 4.8; clear boundary.

B_{22} 13 to 20 inches, weak-red (10R 4/4) clay coated with reddish brown (2.5YR 4/4); strong, medium, blocky structure; plastic and sticky when wet; prominent, continuous clay coats; pH 4.8; smooth, gradual boundary.

B_{23} 20 to 30 inches, reddish-brown (2.5YR 4/4) clay coated with weak red (2.5YR 4/3); moderate, fine and medium, blocky structure; very plastic and sticky when wet; weak, discontinuous clay coats; pH 4.8.

B_3 30 to 40 inches, reddish-brown (5YR 4/3) clay coated with weak red (2.5YR 4/2); weak, fine, blocky structure tending to massive; very plastic and sticky when wet; occasional discontinuous clay coats; common manganese coatings; pH 5.8.

C 40 to 67 inches, reddish-brown (5YR 4/3) clay coated with weak red (10R 4/2), decomposed, shale flakes; massive; slightly plastic and sticky when wet; many manganese concretions; occasional lime specks that increase with depth; pH 6.1.

D 67 inches +, red, alkaline and weakly calcareous clay shale.

Range in characteristics: The texture of the surface soil ranges from silt loam to silty clay. The texture of the B horizon ranges from clay loam to clay. Total depth to the substratum ranges from about 35 to 70 inches or more.

Drainage: Well drained; internal drainage is slow or very slow.

Permeability: Slow to very slow.

Position and slope: Ridgetops, saddles, smooth slopes, and benches in uplands; areas of Upshur-Muskingum soils have irregular, somewhat rounded slopes; moderate number of benches to many benches.

Upshur clay loam, 3 to 10 percent slopes, severely eroded (UcB3).—This is the typical soil as described. It has fairly smooth slopes that are free from steep benches. Erosion has removed most of the original surface soil. The plow layer is heavy, plastic, and sticky and is low in organic matter. In almost all areas there are some gullies. A rotation that includes a sod crop a large part of the time and row crops a small part is suitable. Almost all areas are cleared and are in crops and pasture. Capability unit IIIe–30; soil limited by erosion, erosion hazard, and heavy surface soil.

Upshur clay loam, 10 to 20 percent slopes, severely eroded (UcC3).—This soil has more benches than Upshur clay loam, 3 to 10 percent slopes, severely eroded. Some areas occur on the wider benches that occasionally interrupt the long, steep slopes of the Upshur-Muskingum soils. Erosion has removed most of the original surface soil from this mapping unit. The plow layer remaining is a clay loam. Both surface and gully erosion are very active. About one-half of this soil is in pasture, one-fourth in crops, and one-fourth in woods. Hay in long rotations or pasture grown under good management is needed to prevent runoff and erosion. Capability unit IVe–1; soil limited by erosion and severe erosion hazard.

Upshur clay loam, 10 to 20 percent slopes, very severely eroded (UcC4).—This unit is similar to Upshur clay loam, 10 to 20 percent slopes, severely eroded, but erosion is much more severe. Most or all of the surface soil has been removed, and slips and gullies are numerous. Some gullies are several feet deep. Areas of this soil are usually small, and water from natural draws or upper slopes has collected on them. Water removal, mulching, fertilizing, seeding, and protection from livestock are generally needed. Woodland is suitable for this soil, but trees or shrubs will need to be planted on most areas. Capability unit VIIe–1; soil limited to woodland by very severe erosion.

Upshur silty clay loam, 3 to 10 percent slopes (UhB).—This soil has a coarser surface soil than Upshur clay loam, 3 to 10 percent slopes, severely eroded. The color of the surface soil in most areas is brown instead of red. Much of this unit is in woods and has never been cleared. Areas of this soil are usually small and gently sloping and are mapped within larger and steeper areas of woods. A rotation in which soil crops are grown a large part of the time and row crops a small part is suitable. Capability unit IIIe–30; soil limited by severe erosion hazard.

Upshur silty clay loam, 10 to 20 percent slopes (UhC).—This mapping unit is very similar to Upshur silty clay loam, 3 to 10 percent slopes. It has many benches, and slopes are uneven. It is for the most part surrounded by soils with steeper slopes. Much of the area is in woods, and erosion has not been very active. A rotation in which sod crops are grown a large part of the time and row crops a small part is suitable. Some good woods occur on this soil and warrant intensive management. Capability unit IIIe–30; soil limited by severe erosion hazard.

Upshur-Muskingum complexes

In some areas the Upshur soils occur in an intricate pattern with the Muskingum soils. It was not practical to map the soils in these areas separately. They were therefore mapped together as a complex. These soils, as well as those of the Muskingum-Upshur complexes, were formerly known as the Meigs series. The area occupied by these soils is often called Meigs country.

Areas where the Upshur soils are dominant were mapped as the Upshur-Muskingum complex of soils. The Upshur soils make up about two-thirds of the complex. An intermediate soil with a medium-textured, dark-brown surface soil and a red, fine-textured subsoil makes up 5 to 10 percent. Muskingum soils make up the rest of the complex. They are described under the Muskingum series. However, the percentage of each soil varies. Some of the less steep areas are nearly all Upshur soils, whereas some steep and very steep areas are about half Muskingum soils.

The components of this complex occur in irregular patterns. Small spots, bands, and irregular-shaped areas of the Muskingum soils occur within the Upshur soils. Narrow, alternating bands of the two soils occur on steep and very steep slopes. The Upshur soils have colored much of the Muskingum soils in this complex, so that they are slightly redder in many places than typical.

This complex of soils is almost entirely on the Dunkard geologic series, but small areas are on the Monongahela geologic series. At the level where the Upshur-Muskingum soils occur, the underlying Dunkard geologic series is mostly red, alkaline and calcareous clay shale. This geologic series also contains grayish-green shale that apparently weathers red. Relatively thin strata of gray sandstone and siltstone occur between the red shale layers. Differential weathering of the hard sandstone and soft shale has caused the benches that are characteristic of the landscape. Upshur soils have formed from the red shale, and Muskingum have formed from the gray sandstone.

The elevation of the ridgetops in the uplands where these soils occur is mostly about 800 to 1,000 feet. Major streams occur at about 600 feet. Small streams reach far up the hillsides. Dissection is very complete throughout the area.

Upshur-Muskingum clay loams, 20 to 30 percent slopes, severely eroded (UmD3).—This is one of the smoother units of the Upshur-Muskingum complex of soils. Upshur soils occupy about three-fourths of this unit and influence much of the rest in color. The soils are deep in most places. Erosion has removed most of the surface soil. As a result the plow layer is clay loam and is very sticky and very erodible. These soils have been used extensively for pasture and crops. Sizable acreages are in woods. Capability unit VIe–1; limited to pasture because of severe erosion and moderately steep slopes.

Upshur-Muskingum clay loams, 20 to 30 percent slopes, very severely eroded (UmD4).—This soil is similar to Upshur-Muskingum clay loams, 20 to 30 percent slopes, severely eroded. Erosion, however, has removed all of the original surface soil, and shallow and deep gullies are numerous. Landslips occur in places. Individual areas are small and usually collect water from natural drainageways or upper slopes. Revegetation by grass or trees is needed on this unit. Capability unit VIIe–1; soil limited to woodland because of very severe erosion.

Upshur-Muskingum clay loams, 30 to 40 percent slopes, severely eroded (UmE3).—Upshur soils make up about two-thirds of this complex of soils. The soils in most places are moderately deep. Small, steep and very steep areas between benches are included with this mapping unit. Also included are small areas of the deep, colluvial Vandalia soils. Upshur-Muskingum clay loams, 30 to 40 percent slopes, severely eroded, are used very extensively for pasture. Many brush-covered areas occur. Capability unit VIIe–1; limited to woodland because of severe erosion, severe erosion hazard, and steep slopes.

Upshur-Muskingum clay loams, 30 to 40 percent slopes, very severely eroded (UmE4).—This unit is similar to Upshur-Muskingum clay loams, 30 to 40 percent slopes, severely eroded. Erosion, however, has removed all of the original surface soil, and there are numerous gullies. Individual tracts are small and are considered problem areas. Water removal and revegetation by grass or trees are needed. Capability unit VIIe–3; limited to woodland by very severe erosion and steep slopes.

Upshur-Muskingum clay loams, 40 to 55 percent slopes, severely eroded (UmF3).—These very steep soils have many benches. Erosion has removed most of the original surface soil, and gullies occur. Upshur soils occupy about 60 percent of this complex. They have strongly influenced the Muskingum soils in this unit, both in color and in texture. Consequently, the Muskingum soils are redder and finer textured than typical. The soils in most areas are shallow to moderately deep. Landslips occur. A large part of this unit is now in woods, but much of it has been overgrazed at some time. Capability unit VIIe–1; limited to woodland by severe erosion and very steep slopes.

Upshur-Muskingum clay loams, 40 to 55 percent slopes, very severely eroded (UmF4).—This unit is similar to Upshur-Muskingum clay loams, 40 to 55 percent slopes, severely eroded, but erosion has removed all of the original surface soil. Numerous deep gullies and landslips occur in places. Individual areas are small. Revegetation is needed to control runoff and erosion. These soils can be protected by planting suitable trees and shrubs. Capability unit VIIe–3; limited to woodland by very severe erosion and very steep slopes.

Upshur-Muskingum silty clay loams, 20 to 30 percent slopes (UpD).—This unit is similar to Upshur-Muskingum clay loams, 20 to 30 percent slopes, severely eroded, but the surface texture is slightly coarser. A few small, severely eroded areas are included in this unit. The color of the surface soil is much browner than on the eroded Upshur-Muskingum soils. Much of this unit is in woods. Capability unit IVe–1; limited to long-term hay, pasture, or woods by severe erosion hazard.

Upshur-Muskingum silty clay loams, 30 to 40 percent slopes (UpE).—This unit is similar to Upshur-Muskingum clay loams, 30 to 40 percent slopes, severely eroded. The surface soil is coarser and browner than on the eroded units of the Upshur-Muskingum soils. Much of this unit is now in woods. Capability unit VIe–1; limited to pasture or woods by severe erosion hazard and steep slopes.

Upshur-Muskingum silty clay loams, 40 to 55 percent slopes (UpF).—This unit is similar to Upshur-Muskingum clay loams, 40 to 55 percent slopes, severely eroded. Some small areas with severe erosion are included. The surface soil is browner and coarser than on eroded units of the Upshur-Muskingum soils. Most of this unit is in woods. Capability unit VIIe–1; limited to woodland by very steep slopes.

Vandalia series

The soils of the Vandalia series are deep and well drained. They have developed on colluvial and some alluvial material from Upshur, Upshur-Muskingum, and Muskingum-Upshur soils. They occur at the base of slopes occupied by these soils and are scattered throughout Jackson and Mason Counties.

Profile description of Vandalia silty clay loam, 8 to 15 percent slopes, in Jackson County, 2 miles east of Mount Alto in the woods along U.S. Route 33:

- A_1 0 to 3 inches, very dark grayish-brown (10YR 3/2) silty clay loam; the top one-half inch stained very dark gray (10YR 3/1) with organic matter; fine, granular structure and moderate, fine and medium, subangular blocky structure; friable; contains 5 percent gravel; pH 5.3; clear, irregular boundary.
- A_2 3 to 6 inches, brown (7.5YR 5/4) silty clay loam; stained brown to dark brown (10YR 4/3) with organic matter; moderate, medium, subangular blocky structure; slightly firm when moist and slightly sticky when wet; contains 5 percent gravel; pH 5.2; clear, wavy boundary.
- B_{21} 6 to 13 inches, reddish-brown (5YR 4/4) clay; reddish-brown (5YR 4/3) clay coats on ped faces; strong, medium, blocky and subangular blocky structure; slightly firm when moist and slightly sticky and plastic when wet; contains 5 to 10 percent gravel; pH 4.8; gradual boundary.
- B_{22} 13 to 24 inches, reddish-brown (5YR 4/4) clay; reddish-brown (5YR 5/3) clay coats on ped faces and many fine specks or mottles of reddish brown (2.5YR 4/4); moderate, medium, subangular blocky structure; slightly firm when moist, plastic and slightly sticky when wet; contains 15 percent gravel and rounded, soft, weathered sandstone; gradual boundary.
- B_3 24 to 33 inches, reddish-brown (5YR 5/4) clay; light reddish-brown (5YR 6/3) and reddish-gray (5YR 5/2) clay coats on ped faces; moderate, coarse, subangular blocky structure; firm when moist, plastic and slightly sticky when wet; few manganese coatings; contains 25 percent gravel; pH 4.9; gradual boundary.
- C 33 to 55 inches, reddish-brown (5YR 5/4) silty clay; light reddish-brown (5YR 6/3), reddish-brown (5YR 5/3), and some dark-brown (7.5YR 4/4) clay coats on ped faces; moderate, medium and coarse, platy and blocky structure; firm when moist, plastic and slightly sticky when wet; many manganese coatings; contains 30 percent gravel and stones; pH 5.1.
- D_u 55 inches +, reddish-brown (2.5YR 4/4) clay; moderate, fine and medium, blocky structure; slightly firm when moist, plastic and sticky when wet; pH 5.5

Range in characteristics: The texture of the surface soil ranges from silt loam to silty clay loam. The texture of the subsoil ranges from silty clay loam to silty clay; sandstone fragments make up as much as 30 to 40 percent of the material. The subsoil ranges from strong brown to reddish brown in color and from strongly acid to slightly acid in reaction. Some areas of Vandalia soils occur on alluvial fans. These areas contain more coarse fragments than typical of the series and have somewhat more open subsoil.

Drainage: Well drained.

Permeability: Moderately slow.

Position and slope: Gently sloping to strongly sloping areas at base of slopes.

Vandalia clay loam, 8 to 15 percent slopes, severely eroded (VaC3).—This soil has a profile similar to the one described, but erosion has removed most of the original surface soil. The surface soil is now a clay loam. Slopes are fairly smooth. Almost all of this soil is cleared and is extensively cultivated. Long-term hay is suitable. Conservation measures are needed to control runoff. Capability unit IVe-1; soil limited by severe erosion hazard.

Vandalia clay loam, 15 to 25 percent slopes, severely eroded (VaD3).—This soil consists of areas on moderately steep breaks that were formerly Vandalia silty clay loam and have lost most of the original surface soil through erosion. The plow layer is now a clay loam. This soil usually occurs near the upland. Water disposal and erosion control are problems. Long-term hay is suitable if conservation practices are used. Capability unit VIe-1; soil limited by erosion, slope, and erosion hazard.

Vandalia clay loam, 25 to 35 percent slopes, severely eroded (VaE3).—This soil consists of areas that were formerly Vandalia silt loam and have lost most of the surface soil through erosion. The texture of the surface soil is silty clay loam in some areas. The texture of the subsoil ranges from silty clay loam to clay. There is more coarse material on the surface of this soil and in the subsoil than typical for the series. Woodland or very limited pasture is suitable. Capability unit VIIe-1; soil limited by steepness and erosion.

Vandalia clay loam, 15 to 35 percent slopes, very severely eroded (VaD4).—This soil includes strongly sloping to steep areas that were formerly Vandalia silty clay loam and strongly sloping areas that were formerly Vandalia silt loam. The surface soil has been completely removed by erosion. Gullies and landslips occur frequently. The texture of the subsoil ranges from silty clay loam to clay. Woodland is suited to this soil; plantings are needed on many sites. Capability unit VIIe-1; soil limited by very severe erosion.

Vandalia silt loam, 3 to 8 percent slopes (VdB).—This soil occurs on gently sloping alluvial fans at the mouth of small draws or streams. More coarse fragments than typical of the series occur in this soil. Some areas receive excess surface water. Rotations that include 1 year or more of hay are suitable. This soil is excellent for alfalfa. Capability unit IIe-15; soil limited by slight erosion hazard.

Vandalia silt loam, 8 to 15 percent slopes (VdC).—In most areas, this soil has a silty clay loam subsoil. Small seep spots occur in places. Rotations that include 2 or more years of hay are suitable. Alfalfa-grass mixtures do well. Capability unit IIIe-15; soil limited by moderate erosion hazard.

Vandalia silt loam, 15 to 25 percent slopes (VdD).—Except for slope, this soil is similar to Vandalia silt loam, 8 to 15 percent slopes. A few boulders occur locally on the surface. Rotations that include 4 years or more of hay are suitable. Capability unit IVe-15; soil limited to long-term hay by severe erosion hazard and slope.

Vandalia silt loam, 25 to 35 percent slopes (VdE).—This soil has more coarse material in the profile and on the surface than typical for the series. It usually occurs adjacent to hills. Permanent pasture or woods is needed on this soil. Capability unit VIe-3; soil limited by steep slopes and erosion hazard.

Vandalia silty clay loam, 3 to 8 percent slopes (VsB).—This gently sloping soil usually occurs on alluvial fans. The texture of the subsoil ranges from silty clay loam to clay loam. Rotations that include at least 2 years of hay are suitable. This soil is excellent for alfalfa. Some tobacco is grown. Intensive conservation practices are needed to control runoff and erosion. Capability unit IIIe-30; soil limited by erosion hazard.

Vandalia silty clay loam, 8 to 15 percent slopes (VsC).—This soil has the profile described as representative of the series. A few, small, severely eroded spots occur. Rotations that include 2 or more years of hay are suitable. This soil is excellent for alfalfa. Capability unit IIIe-30; soil limited by severe erosion hazard.

Vandalia silty clay loam, 15 to 25 percent slopes (VsD).—Except for slope, this soil is similar to Vandalia silty clay loam, 8 to 15 percent slopes. Long-term hay with an occasional row crop is suitable if conservation practices are used. Capability unit IVe-1; soil limited by slope and erosion hazard.

Vandalia silty clay loam, 15 to 25 percent slopes, severely eroded (VsD3).—This unit consists of areas that were formerly Vandalia silt loam and have lost most of the surface soil through erosion. The texture of the subsoil is silty clay loam or silty clay in most places. Shallow gullies and occasional landslips occur in places. Long-term hay is suited to this soil. Capability unit VIe-1; soil limited by severe erosion and slopes.

Vandalia silty clay loam, 25 to 35 percent slopes (VsE).—This steep soil is not extensive. The subsoil contains more stones than typical. A few large stones occur on the surface in places. Permanent pasture is suited to this soil. Capability unit VIe-1; soil limited by steep slopes.

Vandalia very stony silt loam, 5 to 15 percent slopes (VvC).—This soil occurs adjacent to upland slopes. It is subject to landslips. In places the texture of the surface soil is silty clay. Stoniness prevents cultivation and limits the use of pasture machinery. Mowing and fertilizing are practical to only a very limited extent. Some areas can be used for permanent pasture, but management is difficult. Christmas trees or other trees are also suitable for this unit. Capability unit VIs-1; soil limited by stoniness.

Vandalia very stony silt loam, 15 to 35 percent slopes (VvD).—This soil is similar to Vandalia very stony silt loam, 5 to 15 percent slopes, but it is moderately steep and in places contains more and larger stones and ledges. It is subject to landslips. Some good bluegrass pastures occur. Woodland is suited to this soil. Capability unit VIIs-1; soil limited by stoniness and steep slopes.

Westmoreland series

The Westmoreland series consists of shallow to moderately deep, well-drained soils on sloping uplands. These soils have developed from interbedded limestone, shale, and sandstone. They are associated with the Brooke, Upshur, and Muskingum soils. They occur in small areas and are only in the northern third of Jackson County. They are near the top of the slopes where the underlying Dunkard geologic series contains limestone.

Profile description of Westmoreland silt loam, 20 to 30 percent slopes, severely eroded, in Jackson County, on Windy Ridge, 4 miles north of Liverpool:

A_p 0 to 6 inches, dark yellowish-brown (10YR 3/4) silt loam; moderate, fine, subangular blocky structure; friable; contains 5 percent shale chips, ½ to 1 inch across; pH 7.0; abrupt boundary.

B_2 6 to 20 inches, brown (10YR 5/3) to yellowish-brown (10YR 5/4), heavy silt loam; moderate, medium, subangular blocky structure; friable; contains 25 to 40 percent weathered shale and sandstone, 6 to 8 inches across; pH 5.6; gradual, irregular boundary.

D 20 inches +, gray sandstone, shale, and limestone; quite variable within short distances.

Range in characteristics: The depth ranges from about 18 to 26 inches over short distances. Sandy areas with less profile development than typical for the series occur on points and narrow ridges.

Drainage: Well drained.

Permeability: Moderately permeable.

Position and slope: Strongly sloping to very steep ridgetops and upper slopes.

Westmoreland silt loam, 10 to 20 percent slopes (WeC).—The profile of this soil is slightly deeper and shows slightly more development than the one described. Most of the original surface soil is present. Most areas are moderately deep. The subsoil is silty clay loam in most areas. Rotations that include at least 2 or 3 years of hay are needed on this strongly sloping soil. Capability unit IIIe-11; soil limited by moderate erosion hazard.

Westmoreland silt loam, 20 to 30 percent slopes, severely eroded (WeD3).—This soil has the profile described as representative of the series. In most areas erosion has removed most of the surface soil, but small areas with moderate erosion are included. This soil has a moderate capacity to hold moisture and has moderate productivity. Steepness limits its use. Most of the acreage has been cleared and is under cultivation or in pasture. With good management practices, moderate to high pasture yields can be expected. Capability unit VIe-1; soil limited by slope and erosion.

Westmoreland silt loam, 30 to 40 percent slopes, severely eroded (WeE3).—The profile of this soil is shallower than typical for the series. Erosion has removed most of the original surface soil. This soil has some benches. It is slightly droughty. Small areas of Upshur-Muskingum soils are included with this soil. Capability unit VIIe-1; soil limited to woodland by slope and erosion.

Westmoreland silt loam, 40 to 55 percent slopes, severely eroded (WeF3).—A few sandstone and limestone ledges occur in places on this soil. This very steep soil is best suited to timber production. Cleared areas should be planted to suitable tree species and protected from fire and grazing. Small areas of Upshur-Muskingum soils are included with this soil. Capability unit VIIe-1; soil limited by very steep slopes and erosion.

Wharton series

The Wharton soils in Jackson and Mason Counties are mapped only in undifferentiated units with the Tilsit soils. They occur on level to gently sloping ridgetops, mainly in the southern parts of these counties. They are adjacent to the Muskingum-Upshur and Upshur-Muskingum complexes of soils, which are on stronger slopes. They have developed from acid gray sandstone, siltstone, and some red clay shale. The subsoil is fine textured and is reddish in some areas. Because of their occurrence and characteristics, the Tilsit and Wharton soils were mapped together.

Profile description of Wharton silt loam, 3 to 8 percent slopes, 3.5 miles south of Upland:

A_1 0 to 3 inches, dark grayish-brown (10YR 4/2) silt loam; weak, granular structure; loose; pH 5.0; clear, wavy boundary.

A_2 3 to 9 inches, brown (10YR 5/3) silt loam; weak, medium platy structure; friable; pH 4.8; clear, wavy boundary.

B_2 9 to 20 inches, dark yellowish-brown (10YR 4/4) silt loam to silty clay loam; strong, medium, subangular blocky structure; brown (7.5YR 5/4) coatings on ped faces and yellowish-brown (10YR 5/4) splotches; firm; pH 4.8; clear, wavy boundary.

C 20 to 40 inches, dark yellowish-brown (10YR 4/4) clay loam with many, coarse mottles of reddish brown (5YR 4/4) and pale brown (10YR 6/3) in equal proportion; massive; very firm; pH 4.8.

D_r 40 inches +, red and yellow shales.

Range in characteristics: The subsoil is clay loam to clay. Colors in the B and C horizons range from yellowish brown to reddish brown. In most places in these counties, the Wharton soils overlie red shale. Depth to mottling ranges from 16 to 24 inches. Some areas near the Ohio River have a very silty surface layer of windblown material.

Drainage: Moderately well drained.

Permeability: Moderately slow to slow.

Position and slope: Level to gently sloping ridgetops.

Wheeling series

The soils of the Wheeling series are deep and well drained. They have developed on terraces from glacial outwash material carried by the Ohio River. They are underlain by sand and gravel. These soils are the well-drained members of the Wheeling-Sciotoville-Ginat-Chilo drainage catena. They occur along the Ohio River in Jackson and Mason Counties. These soils are being rapidly used for urban and industrial sites.

Description of Wheeling silt loam, 0 to 3 percent slopes, in Mason County, on a wildlife refuge, one-half mile north of the headquarters of the Conservation Commission of West Virginia:

A_p 0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; pH 6.4; abrupt, smooth boundary.

A_2 9 to 12 inches, yellowish-brown (10YR 5/4) silt loam; very weak, medium, subangular blocky structure; friable; pH 6.9; abrupt, wavy boundary.

B_1 12 to 16 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, medium, subangular blocky structure; friable; pH 6.7; clear, wavy boundary.

B_2 16 to 23 inches, yellowish-brown (10YR 5/6), heavy silt loam; moderate, medium, subangular blocky structure; peds distinctly coated with clay skins; slightly firm; few manganese coatings; pH 5.8; clear, wavy boundary.

B_3 23 to 38 inches, yellowish-brown (10YR 5/6) silt loam; dark yellowish-brown (10YR 4/4) clay coats on ped faces; weak, fine and medium, subangular blocky structure; numerous manganese coats and concretions; discontinuous clay films; pH 5.0; clear, wavy boundary.

D_1 38 to 49 inches, dark-brown (7.5YR 4/4) sandy clay loam; weak, coarse, subangular blocky structure; friable; discontinuous, common clay films; pH 5.0; gradual, wavy boundary.

D_2 49 to 72 inches +, dark-brown (7.5YR 4/4) sandy loam or loamy sand; structureless; very friable; pH 5.0; underlain at various depths by gravel and sand.

Range in characteristics: The texture of the B horizon ranges from fine sandy loam to silty clay loam. Gravel content in the solum ranges from none to about 10 percent. Depth to the D horizon ranges from about 30 to 40 inches. Depth to underlying gravel ranges from about 5 feet to 25 or 30 feet, depending on position and slope.

Drainage: Well drained.

Permeability: Moderate to rapid.

Position and slope: Nearly level river terraces; between terrace levels and along streams that dissect terraces, breaks in slope are steeper.

Associated with Wheeling silt loam and Wheeling fine sandy loam on level or gentle slopes are areas of the excessively drained Wheeling gravelly sandy loam, coarse subsoil variant. This variant has developed from the same glacial outwash materials as the associated Wheeling soils. It lacks, however, a silty or sandy mantle over the gravel. The entire solum is gravelly, and profile development is weak. In some areas the compact layers in the B_3 horizon are absent. Permeability is very rapid. Clean, stratified gravel and sand occur at shallow depths along the edge of these soil areas. Here there are many gravel pits. This coarse subsoil variant makes excellent industr l sites. The large aluminum plant at Ravenswood is n inly on these soils.

Typical profile of Wheeling gravelly sandy loam, coarse subsoil variant, 0 to 3 percent slopes, one-half mile north of Lakin State Hospital:

A_p 0 to 8 inches, dark-brown (10YR 3/3) gravelly sandy loam; structureless; loose; 25 percent gravel; pH 6.2; clear boundary.

B_1 8 to 15 inches, dark yellowish-brown (10YR 4/4) gravelly sandy loam; very weak, coarse, loosely coherent lumps; 35 percent gravel; pH 5.4.

B_2 15 to 25 inches, dark yellowish-brown (10YR 4/4) very gravelly sandy loam; structureless; some clay films on top of gravel and a few clay bridges between sand grains; loose; 60 percent gravel; pH 5.4; clear boundary.

B_3 25 to 35 inches, dark yellowish-brown (10YR 4/4) and dark-brown (10YR 4/3) very gravelly loamy sand; horizon consists of alternating layers (3 to 5 inches thick) that are slightly compact and firm; some clay bridging and layers 4 to 6 inches thick that are loose and show no bridging; 70 percent gravel; pH 5.6; gradual boundary.

D 35 inches +, stratified gravel and sand containing a few pieces of igneous gravel and some limestone skeletons; these strata are many feet deep.

Wheeling silt loam, 0 to 3 percent slopes (WsA).—This soil has the profile described as representative of the series. All locally grown crops are suited. A cropping system that includes a row crop grown every year and followed by a cover crop is suitable. Also suitable is a row crop the first year, small grain the second, and hay the third. Permanent alfalfa hay is also suited to this soil. Capability unit I–4.

Wheeling silt loam, 3 to 8 percent slopes (WsB).—This gently sloping soil is usually in long, narrow tracts that are subject to slight sheet erosion. A rotation that includes 1 year or more of hay is suited if contour farming is used. Permanent hay is also suitable. Capability unit IIe–4; soil limited by slight erosion hazard.

Wheeling silt loam, 8 to 15 percent slopes (WsC).—This strongly sloping soil occurs in very narrow tracts. It has a coarser textured subsoil than typical of the series and is slightly droughty. It is subject to sheet erosion. It is usually managed with less sloping areas. Where it can be worked as a separate unit, long rotations or long-term hay are suitable. Capability unit IIIe–4; soil limited by slope and moderate erosion hazard.

Wheeling fine sandy loam, 0 to 3 percent slopes (WfA).—The profile of this soil is coarser textured throughout than the one described. This soil is more droughty than Wheeling silt loam, 0 to 3 percent slopes. Rotations that include 1 year of hay are suitable. This unit is also well suited to early vegetables. Capability unit IIs–2; soil limited by droughtiness.

Wheeling fine sandy loam, 3 to 8 percent slopes (WfB).—This soil is gently sloping, coarse textured, and subject to slight sheet erosion. Rotations that include 2 or more years of hay are recommended. Contour tillage should be used where possible. Capability unit IIs–2; soil limited by droughtiness and slope.

Wheeling fine sandy loam, 8 to 15 percent slopes (WfC).—The profile of this soil is somewhat coarser textured than the one described as representative of the series. It is more droughty than Wheeling silt loam, 0 to 3 percent slopes. It occurs as narrow strips between two levels; in many places it occurs with less sloping soils on bottom land or terraces. Long rotations or long-term hay are desirable on areas large enough to be worked as a separate unit. Capability unit IIIs–1; soil limited by droughtiness and moderate erosion hazard.

Wheeling gravelly sandy loam, coarse subsoil variant, 0 to 3 percent slopes (WgA).—This soil has the profile described as representative. Rotations that include 1 or more years of hay are recommended. This soil is droughty and has low fertility. Truck crops can be grown if the soil is irrigated. Capability unit IIs–2; soil limited by droughtiness.

Wheeling gravelly sandy loam, coarse subsoil variant, 3 to 8 percent slopes (WgB).—This soil is droughty. Areas are usually narrow. Rotations that include 2 or more years of hay are suitable. Capability unit IIs–2; soil limited by droughtiness and slight erosion hazard.

Zoar series

The Zoar series consists of deep, moderately well drained soils with heavy subsoils. They have developed on alluvial sediments from gray and red shale and some sandstone deposited by slack water. These soils occur along the larger streams in Jackson and Mason Counties and along the Kanawha River in Mason County. They occur in association with Tyler and Purdy soils. In drainage and position, the Zoar soils are similar to the Monongahela soils, but they have a clayey subsoil instead of a medium-textured subsoil with a fragipan.

Description of Zoar silt loam, 2 to 6 percent slopes, in Jackson County, 3½ miles west of Ripley along U.S. Route 33:

A_1 0 to 2 inches, dark-brown (10YR 4/3) silt loam; weak, fine, subangular blocky structure; loose; pH 6.2; clear, wavy boundary.

A_2 2 to 8 inches, yellowish-brown (10YR 5/4) silt loam; thin, platy structure; very friable; pH 5.4; clear, wavy boundary.

B_{21} 8 to 19 inches, yellowish-red (5YR 4/6) silty clay loam; brown (7.5YR 5/4) clay coats on ped faces; strong, medium, and coarse, subangular blocky structure; firm; pH 5.2; clear, wavy boundary.

B_{22g} 19 to 35 inches, yellowish-red (5YR 5/6) silty clay; light-gray and white (10YR 7/2 and 8/1), common, medium mottles and streaks that are more pronounced with depth; light reddish-brown (5YR 6/3) clay coats on ped faces; strong, coarse, blocky structure; firm; fine sandy lenses and manganese coatings throughout horizon; clear, wavy boundary.

C 35 to 45 inches, clay; the same color as B_{22g} horizon; strong, coarse, blocky structure; firm; pH 5.2.

D_u 45 inches +, stratified sand and clay.

Range in characteristics: The texture of the surface soil ranges from silt loam to silty clay loam. The texture of the B horizon ranges from silty clay loam to clay, and the color from yellowish brown to yellowish red. These soils are usually acid. Some areas, however, overlie alkaline slack-water clay that is neutral to alkaline at about 4 feet. The substratum ranges from alkaline clay to acid clay and silt.

Drainage: Moderately well drained.

Permeability: Moderately slow.

Position and slope: Nearly level to moderately steep slack-water deposits.

Zoar silt loam, 2 to 6 percent slopes (ZoB).—This soil has the profile described as representative of the series. Almost all areas are cleared. Surface drainage is slow in many places, and some small, very wet spots occur. Rotations that include 2 years of hay are suitable for this soil. Some level areas are included with this soil as mapped. Capability unit IIe-13; soil limited by slight erosion hazard and slight wetness.

Zoar silt loam, 6 to 12 percent slopes (ZoC).—This soil has better surface drainage than Zoar silt loam, 2 to 6 percent slopes. Small, eroded spots occur. Rotations that include 2 or 3 years of hay are suited. Capability unit IIIe-13; soil limited by moderate erosion hazard.

Zoar silt loam, 6 to 12 percent slopes, severely eroded (ZoC3).—This unit is similar to Zoar silt loam, 6 to 12 percent slopes, except that erosion has removed most of the original surface soil. Some small areas have gullies. Many areas receive surface water from hill slopes. Rotations that include 3 or more years of hay are suitable. Capability unit IVe-9; soil limited by erosion and severe erosion hazard.

Zoar silt loam, 12 to 25 percent slopes, severely eroded (ZoD3).—This unit has lost most of the original surface soil through erosion. Some areas receive much water from higher land. Many areas are near hills, and some material from the adjoining uplands are washed on them. Permanent pasture is needed on this soil to control excess runoff and erosion. Capability unit VIe-2; soil limited by severe erosion, slope, and severe erosion hazard.

Formation and Classification of Soils

Factors of Soil Formation

Topography, rocks or other kinds of parent material, climate, vegetation, and time influence the formation of the soils. One factor may be dominant, but all have some effect. Man has influenced the soils by changing some of these factors, especially vegetation.

Topography, time, and parent material

The past and present topography, time, and parent material are discussed together in this section because of their interrelated effects on the soils. Geology is closely linked with these factors of soil formation.

Characteristic landforms of the two counties are (1) uplands and colluvial slopes and (2) bottom lands and terraces.

Uplands and colluvial slopes.— Many ridges of narrow to medium width are characteristic of the uplands of both counties. These ridges are somewhat irregular and have many low swells and saddles. Their crests are mostly 800 to 900 feet in elevation in Mason County, but they rise to about 1,200 feet in northeast Jackson County. These ridges are the remnants of an old plateau. Slopes have many benches because of differential weathering. The more resistant sandstone forms the steep ledges, and the softer, more easily weathered shale forms the flatter benches between them (fig. 9). The area is completely

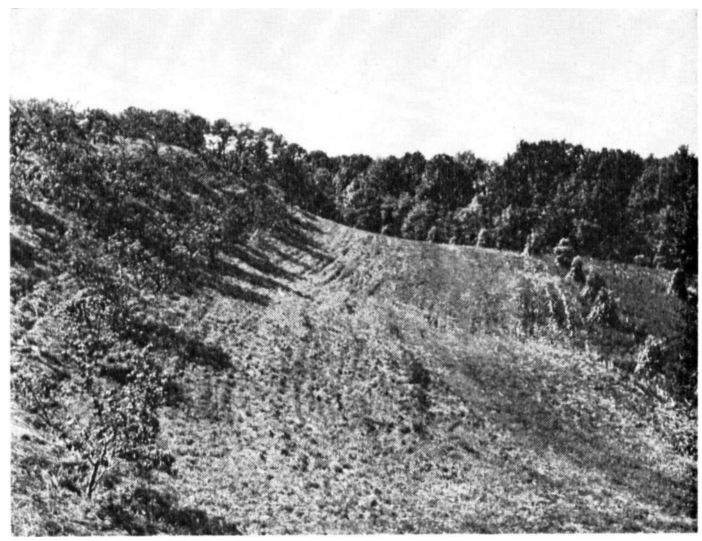

Figure 9.—**Bench topography on Upshur-Muskingum soils. Bluff is underlain by sandstone, and smooth bench by red clay shale. Row crops and hay strips on smooth bench; peach orchard on bluff.**

dissected by streams, and the topography looks the same in all directions. It does not have the smooth appearance typical of sandstone uplands. Small streams reach almost to the ridgetop, and many slopes are concave. There is much runoff.

Reddish, clayey, colluvial material from these red shale and sandstone uplands has accumulated to considerable depths at the bottom of the slopes. It has been influenced by lime from limy shale and from ground water from this shale.

Typical soils on the uplands and colluvial slopes are the Upshur, Muskingum, Tilsit, Wharton, and Vandalia. Upshur soils have developed from the alkaline or calcareous, red or gray-green shale on gently to strongly sloping areas. These soils are red and have a clayey subsoil. Water movement through the subsoil is very slow. Muskingum soils have developed from gray, acid sandstone and siltstone on sloping to very steep slopes. They are shallow to moderately deep and have only weakly developed horizons. The Upshur and Muskingum soils occur in a very mixed pattern and for the most part are mapped together as soil complexes. The Tilsit and Wharton soils on the smooth, gently sloping ridgetops have strongly leached, strongly developed horizons. They have developed from both sandstone and shale. Vandalia soils have developed in deep colluvium from the red shale and sandstone uplands.

In Jackson and Mason Counties, the bedrock at or near the present surface is mainly of the Dunkard formation of Permian age and the Monongahela formation of Pennsylvanian age. The Conemaugh formation, also of the Pennsylvanian age, is exposed in very limited areas in southeastern Mason County. Almost all of the deposits that later formed the rocks were laid down in fresh water. The youngest exposed rocks in the two counties are of the Dunkard geologic series. All of these formations contain carbonaceous deposits.

The Dunkard, Monongahela, and Conemaugh formations are quite similar in general makeup. The strata are nearly horizontal. Essentially, all three formations have about the same sequence of exposed rocks. A typical sequence of rocks is (1) gray sandstone that is very massive locally but in most places is interstratified with shaly seams; (2) gray-green siltstone grading into shale; (3) calcarous shale that is greenish gray to grayish red in most places but purplish in some and is usually not bedded; (4) clay shale and gray siltstone; and (5) sandstone again. This sequence varies, but on the whole it occurs many times on a typical slope—from the main drainage area at an elevation of about 560 to 600 feet to the top of the ridges at 800 to 1,100 feet.

The rocks of the Dunkard formation underlie most of Jackson County. There are thicker red shale beds and less sandstone where this formation is exposed than in exposures of the Monongahela or Conemaugh formation. The Upshur-Muskingum soil complex is very extensive in areas where the Dunkard formation outcrops. In northeast Jackson County, at elevations of about 1,100 feet, limestone of the Nineveh formation outcrops. The Westmoreland and Brooke soils have developed on the limestone and calcareous shale of this formation.

The rocks of the Monongahela formation underlie most of Mason County. More beds of massive sandstone and fewer of red shale are exposed in this formation than in the Dunkard. The very limited areas where the Conemaugh rocks are exposed also have massive sandstone beds and thin beds of red shale. The Muskingum-Upshur soil complex occurs extensively on the areas underlain by the Monongahela and Conemaugh formations.

Bottom lands and terraces.—The terraces along the Ohio River were deposited as glacial outwash south of the area covered by the continental ice sheet. This sheet was presumably of Wisconsin glacial age. The deposits occurred during the last stages of the glacial age when the Ohio River was beginning its present course. They consist of mixed material and contain a small amount of carbonate rocks and 5 to 10 percent of igneous gravel. These deposits are thick along the Ohio River in Jackson and Mason Counties. In most places a mantle of silt and sand covers the gravel deposits. The Ohio River is still flowing on glacial outwash gravel that is as much as 50 feet thick (*6*). At Letart in Mason County, however, bedrock is exposed on the river bottom. Wheeling and associated soils are developed on these deposits.

The recent deposits on bottom lands along the Ohio and Kanawha Rivers contain some carbonates. They are mostly silt and sand and have developed from a mixture of acid sandstone and shale and some limestone and limy shale. Huntington and associated soils occur on these bottom lands.

Wind-deposited silt and sand occur along the eastern side of the Ohio River. The source was apparently the Ohio River bottom lands and terraces. Lakin and Duncannon soils occur on these deposits.

Terraces consisting of alkaline material deposited in slack water occur along both the Ohio and Kanawha Rivers and many other streams in Jackson and Mason Counties. They may be remnants of terraces formed when the Ohio River, blocked by glacial ice farther south, laid down thick deposits. Markland and McGary soils occur on these deposits.

High-terrace deposits occur on the Upper Flats in Mason County, and to some extent in Jackson County. The terraces are not clearly defined, but most of them occur at about the same elevation, generally about 800 feet above sea level. Areas are level or gently sloping. Holston and Monongahela soils with strongly developed horizons occur on the high terraces. Some of the Monongahela soils are underlain by reddish, heavy alkaline clay of undetermined origin. These clays may have been deposited by local sedimentation from the surrounding uplands that consist of limy red clay.

It is thought that these high terraces were laid down in preglacial time by parts of the Old Teas River drainage system before the Ohio River began its present course. When the glacial advances blocked the northward course of the Monongahela-Allegheny Rivers, they overflowed to the south and formed the present Ohio River drainage system. The silty nature of the surface material on the high terraces strongly suggests that they received windblown material from the Ohio River deposits to the west.

Other terraces along the Ohio and Kanawha Rivers and other large streams are at elevations of approximately 650 feet. The Wheeling and associated soils are found at this elevation. The Wheeling soils are deep and have a moderate degree of horizon development. In places soils with strongly developed horizons like those of the Zoar are on the terraces that are at about 650 feet, especially along the Kanawha River. Small areas of Monongahela soils also occur at this level but have less strongly developed horizons than the areas of Monongahela soils on the old, higher terraces.

Alluvial deposits on bottom lands are relatively young; soil material is added when streams overflow. Little soil development has taken place in these materials. Huntington and Moshannon are examples of soils on bottom lands.

Vegetation

Jackson and Mason Counties were covered by dense hardwood forest that consisted of oak, ash, walnut, and yellow-poplar. Sycamore, elm, sweetgum, and other species of the bottom lands occupied some of the alluvial and terrace areas. Under this forest vegetation, only a shallow layer of humus was formed. Therefore, most of the soils had thin organic surface soils while in forest vegetation. Trees recycle some of the bases and help enrich the surface soil with nutrients and lime. Unless limed, however, the present surface layers of soils of Jackson and Mason Counties are acid.

Climate

The climate of Jackson and Mason Counties is generally uniform over the entire area. It is therefore not responsible to any great extent for local soil differences. Climate acting with other soil-forming factors, however, is important in producing some of the major characteristics found in the dominant soils of these counties. All of the extensive soils, for example, are low in organic matter and fairly well leached of bases in the upper part of the solum. A climatic summary for the counties is given in another part of the report.

Classification of Soils

The most widely used broad category for grouping soil series in the United States is the great soil group. There are a great many series but only several dozen great soil groups. By knowing the main features of a great soil group, we can have a general picture of each of the component series. Furthermore, it is easier to compare the soils of Jackson and Mason Counties with those in other parts of the country by classifying them in great soil groups.

A great soil group consists of many series that have major profile characteristics in common. All members of a great soil group have the same number and kinds of definitive horizons, although these horizons will not be exactly the same in every profile. For example, a definitive horizon may be faint in some soils and prominent in others within the same great soil group. Representative profiles of the soil series in Jackson and Mason Counties are given in the section Descriptions of the Soils.

Soil series in Jackson and Mason Counties are classified into great soil groups and intergrades as follows:

I. Gray-Brown Podzolic soils:
  1. Central concept: Brooke, Markland, Upshur, Vandalia.
  2. Intergrading to Red-Yellow Podzolic soils: Sciotoville, Westmoreland, Wheeling.
  3. Intergrading to Low-Humic Gley soils: McGary.
  4. Intergrading to Alluvial soils: Ashton, Hackers.

II. Red-Yellow Podzolic soils:
  1. Central concept: Holston, Monongahela, Tilsit, Wharton, Zoar.
  2. Intergrading to Planosols: Tyler.

III. Sols Bruns Acides:
  1. Central concept: Duncannon.
  2. Intergrading to Lithosols: Muskingum.

IV. Planosols:
  Purdy.

V. Low-Humic Gley soils:
  Ginat, Melvin.

VI. Humic Gley soils:
  Chilo.

VII. Alluvial soils:
  Huntington, Lindside, Moshannon, Senecaville.

VIII. Regosols:
  1. Intergrading to Gray-Brown Podzolic soils: Lakin.

Table 8 shows the relationship of parent material and drainage and how these have affected the soil series in the county. As may be noted from the table, several series may develop from the same kind of parent material, depending upon the degree of internal drainage.

TABLE 8.—*Soil series of Jackson and Mason Counties and their parent materials and drainage*

Principal parent materials	Well drained	Moderately well drained	Somewhat poorly drained	Poorly drained	Very poorly drained
Upland:					
Acid gray sandstone and siltstone	Muskingum	Tilsit			
Acid gray sandstone, siltstone, and some red clay shale		Wharton			
Mixed limestone, sandstone, and siltstone	Westmoreland				
Limestone	Brooke				
Alkaline and calcareous red clay shale	Upshur				
Hillside foot slopes, or terraces:					
Mixed, limy, red clay shale, sandstone, and siltstone	Vandalia				
Wind-deposited silt	Duncannon				
Wind-deposited and water-deposited sands	Lakin [1]				
Alluvial terraces above flooding and very old deposits on high upper flats:					
Silt, sand, and some clay over stratified sand and gravel	Wheeling	Sciotoville		Ginat	Chilo.
Silt, sand, gravel, and cobbles	Holston	Monongahela			
Acid silt and clay deposited in slack water		Zoar	Tyler	Purdy	
Alkaline clay deposited in slack water		Markland	McGary		
Flood plains:					
Alluvial material from uplands underlain by limy shale and some acid sandstone and shale.	Huntington	Lindside [2]		Melvin	
Alluvial material from uplands underlain by limy shale and some acid sandstone and shale (high bottoms).	Ashton	Lindside [2]		Melvin	
Alluvial material from uplands underlain by red limy shale and acid sandstone.	Moshannon	Senecaville			
Alluvial material from uplands underlain by red limy shale and acid sandstone (high bottoms).	Hackers	Senecaville			

[1] The Lakin soils are excessively drained.
[2] The Lindside series is typically moderately well drained but includes some soils that are somewhat poorly drained.

Great soil groups

The characteristics of the great soil groups in Jackson and Mason Counties are described in the following paragraphs.

The Gray-Brown Podzolic soils in undisturbed areas have a thin surface covering of dark humus. Beneath this is a thin, dark-colored layer underlain by a moderately leached, grayish-brown layer. Under these surface horizons is the yellowish-brown subsoil; it is somewhat finer textured than the overlying grayish-brown horizon. The subsoil has some accumulation of clay and is fairly high in base saturation.

The Red-Yellow Podzolic soils also have thin or very thin humus layers and thin, dark surface layers. A light-colored leached layer of considerable thickness usually occurs. The subsoil is generally yellowish or reddish and contains a fair amount of clay. Easily weathered minerals have been decomposed and have been lost from the upper horizons and to a great extent from the lower, or B, horizon. Base status in these soils is usually low.

The Sols Bruns Acides in undisturbed areas have a thin covering of dark-brown organic matter over a thin, very dark grayish-brown mineral horizon that is highly enriched with organic material. This mineral horizon overlies a paler A horizon that is little different from the B horizon below. The B horizon is uniformly dark yellowish brown or dark brown throughout. The soils are acid and have a low base status. They have uniform texture throughout the solum, in contrast to the distinct silicate clay accumulation in the B horizons of the Gray-Brown Podzolic and the Red-Yellow Podzolic soils.

The Lithosols, Alluvial soils, and Regosols occur alone or as intergrades. They are made up of soils that are very young, are very steep, or have parent material in which little horizonation and development have taken place.

Lithosols are shallow soils formed on bedrock. They have little or no soil development. They consist mainly of a partly weathered mass of rock. They are commonly found on steep slopes. These soils are young because geologic erosion constantly removes surface material, and distinct horizons do not develop.

Alluvial soils are relatively young soils formed on stream-deposited materials. The soils on these materials have not had time to form distinct horizons. New deposits may be added annually by sedimentation from overflow or by shifting stream channels.

Regosols are soils without definite horizons that have developed from deep, unconsolidated materials. The parent materials for the Regosols in Jackson and Mason Counties are deep, windblown sands.

The soils of three great soil groups—Planosols, Low-Humic Gley, and Humic Gley—have distinct characteristics because of very fine textured parent material, or impeded drainage, or both.

Planosols have developed from fine-textured parent materials in areas with low relief and impeded drainage. They have a well-developed claypan subsoil. The Planosols are distinguished by having a subsoil markedly higher in clay than the surface soil.

Low-Humic Gley soils are poorly drained. They have a dark grayish-brown surface horizon that contains moderate amounts of organic matter. The subsoil is gray or brownish and is strongly mottled. A high water table is common.

Humic Gley soils are very poorly drained. They have very dark gray surface soils that contain considerable organic matter. They normally have heavy, gray subsoils that are waterlogged most of the time.

Gray-Brown Podzolic soils.—The Brooke, Markland, Upshur, and Vandalia are Gray-Brown Podzolic soils.

These soils have medium and moderately fine textured, brownish or reddish surface horizons and have thin, gray A_2 horizons when not eroded. The B horizons are finer textured than the surface horizons, are brownish or reddish, and have moderately developed structure. Leaching and weathering processes have been moderate. Weathering of minerals in the B horizon has not advanced very far. Base saturation in the B horizon is 35 percent or more.

Upshur and Vandalia soils have heavy red subsoils. These characteristics, as well as the fine-textured subsoils of the Brooke and Markland series, are inherited from the parent material.

Brooke clay loam (see profile description in section Descriptions of the Soils) is considered a typical Gray-Brown Podzolic soil in Jackson and Mason Counties.

Gray-Brown Podzolic soils intergrading to Red-Yellow Podzolic soils.—The Sciotoville, Westmoreland, and Wheeling soils in Jackson and Mason Counties have characteristics of two great soil groups. They are dominated by characteristics of the Gray-Brown Podzolic group but have some of the characteristics of the Red-Yellow Podzolic group. They are considered to be intergrades.

These soils have moderately thin, light-colored A_2 horizons and yellowish-brown B horizons. Clay pickup in the B horizons is only moderate. Leaching and weathering of minerals are moderately advanced.

Gray-Brown Podzolic soils intergrading to Low-Humic Gley soils.—The soils of the McGary series are dominated by characteristics of the Gray-Brown Podzolic group but have some characteristics common to the Low-Humic Gley group. These soils have gray-brown, medium-textured surface soils and moderately fine textured B horizons. Base saturation is moderately high—an indication of only moderate leaching of bases. The B horizons have the pale colors associated with gleying processes. The surface soils have a slight accumulation of organic matter resulting from a high water table.

Gray-Brown Podzolic soils intergrading to Alluvial soils.—The Ashton and Hackers soils show somewhat less development than typical but are within the range of the Gray-Brown Podzolic group. They have a faint B horizon, the texture of which is very little finer than that of the A horizon.

Red-Yellow Podzolic soils.—Soils of the Holston, Monongahela, Tilsit, Wharton, and Zoar series are in this great soil group.

Soils in this group have medium-textured, brown surface soils and moderately deep, light-colored, leached A_2 horizons. The B horizons show a marked increase in clay and have strong color, usually yellowish brown. In most of these soils, the presence of a fragipan in which fine materials have accumulated is additional evidence of strong downward movement. Easily weathered minerals have been leached to a large extent from these soils. The percentage of base saturation is lower than 35.

Tilsit and Zoar are representative of the Red-Yellow Podzolic soils. The stronger red colors of some of the Wharton soils are inherited from red shale. In Jackson and Mason Counties, some of the Monongahela soils rest on alkaline, nonconforming D horizons. These soils have a slightly higher base status in the lower subsoils than is typical of Red-Yellow Podzolic soils.

Red-Yellow Podzolic soils intergrading to Planosols.—The Tyler soils have some characteristics both of Red-Yellow Podzolic soils and of Planosols. They have somewhat poorer drainage than is typical of Red-Yellow Podzolic soils. In the upper part of their profile, they are similar to Red-Yellow Podzolic soils. In the lower subsoil, however, there is clay or silty clay resembling that in the Planosols. The change to a clay or silty clay layer is not so abrupt as in typical Planosols. Apparently, the characteristics of the lower subsoil of the Tyler soils result more from the parent materials than from other factors of soil formation.

Sols Bruns Acides (*2*).—Soils of the Duncannon series belong to the Sols Bruns Acides great soil group. These soils are strongly leached and acid. The color contrast between the A and B horizons is small. The soils have a more distinct increase in clay in the B horizon than is typical for Sols Bruns Acides.

Sols Bruns Acides intergrading to Lithosols.—The Muskingum soils have characteristics of both the Sols Bruns Acides and Lithosols great soil groups and are considered intergrades.

The Muskingum soils range in depth from shallow to moderately deep. Those in Jackson and Mason Counties do not show much horizonation. The profile development that does occur is mainly that characteristic of the Sols Bruns Acides group. The Muskingum soils show evidence of leaching, and the color of the B horizon is slightly stronger than that of the A and the texture is about the same as in the A horizon. Muskingum soils intergrade to Lithosols because of their shallow to moderate depth and weak horizonation.

Planosols.—The Purdy series is representative of the Planosol great soil group in Jackson and Mason Counties. The soils of this series have developed on fine-textured materials in nearly level or slightly depressed positions. They have a well-developed, gray claypan subsoil. The gray color results from almost continuous waterlogging. The surface soil is medium textured, and the profile grades abruptly to a fine-textured B horizon.

Low-Humic Gley soils.—The Ginat and Melvin series are representative of the Low-Humic Gley soils. The soils of these series are waterlogged for a considerable part of the time, and soil development is influenced by the high water table. Gray-brown surface horizons with a moderate humus content, and gray, silty clay, mottled subsoils are typical. Downward leaching has not been strong. The gray colors and mottling are caused by waterlogging and lack of oxygen. Melvin silt loam is a representative Low-Humic Gley soil.

Humic Gley soils.—The Chilo series is in the Humic Gley great soil group.

The soils of this series are poorly or very poorly drained. If these soils are not artificially drained, water stands on them permanently or for long periods. Chilo soils have a dark-gray surface soil with a moderately high humus content. The B horizons are gray and highly mottled and have a sandy clay texture. Waterlogging, which prevents normal oxidation, causes the gray colors and mottling. Leaching and translocation of fine materials are very slow.

Alluvial soils.—The Huntington, Lindside, Moshannon, and Senecaville soils are classified as Alluvial soils.

Huntington soils are typical of this group. These soils are on the bottom lands. They show slight or very slight evidence of horizons. The A_p horizon, however, may be slightly darker than the rest of the soil. There is slight evidence that clay has moved from the upper horizons and has accumulated in the lower horizons. Colors are usually about the same throughout the soil. These fertile soils exhibit high base status throughout the solum. Organic matter in the subsurface horizon is high—as much as 0.5 percent organic carbon at depths of 47 to 57 inches.

The Lindside and Senecaville soils occur on both normal and high bottoms. On high bottoms these soils show some horizonation and evidence of soil-forming processes typical of the Gray-Brown Podzolic soils, but they are considered to be within the range of the Alluvial soils.

Regosols intergrading to Gray-Brown Podzolic soils.—The Lakin soils have many characteristics of the Regosol group. They are deep, sandy soils with very little profile development. There is a faint color contrast between the surface layers and the underlying material.

There is also evidence of a discontinuous B horizon in the occasional lenses containing slightly more clay and iron oxide than the adjacent horizons. This weak profile development and the moderately high base saturation in the B horizon are more characteristic of the Gray-Brown Podzolic soils than of any other great soil group. Hence, the Lakin soils are considered intergrades to the Gray-Brown Podzolic soils.

General Nature of the Area

Early Settlement and Development

Very early settlements were made near Point Pleasant in 1774, after the Indian War, but it was not until about 1800 that sizable permanent settlements were made in Jackson and Mason Counties. Farms were of the subsistence type. Early settlers cleared and farmed bottom lands first and gradually worked back into the hill country.

The building of turnpikes, as the James River and Kanawha Turnpike from Richmond, Va., to Guyandotte, W. Va., helped develop the area. The Charleston-Point Pleasant turnpikes along each side of the Kanawha River were opened in 1851 and 1861. A system of locks on the Kanawha and Ohio Rivers fostered river transportation. Lumbering was an important industry in the early history of these counties.

Agriculture and Land Use

In 1954, Jackson County had 1,751 farms with an average size of 121.7 acres. Mason County in 1954 had 1,648 farms with an average size of 122 acres.

Most of the farms in the area are of the general type. A rotation commonly used on these farms consists of corn, wheat, or oats and 2 or more years of red clover and grass meadow. Most general farms keep a few beef cattle. Sheep are not extensively raised in these counties. Tobacco is a cash crop on many farms. Along the Ohio and Kanawha Rivers and on the smooth upland areas, the farms are generally larger than elsewhere. Many of these are dairy and beef-cattle farms. Corn is raised extensively on these farms for feed and for sale.

Many of the general farms have been allowed to grow up partially in natural vegetation for the past two decades, as many farmers have accepted full or part-time employment in nearby industrial plants. The larger dairy and beef-cattle farms have changed very little. The dairy farmers in Jackson and Mason Counties are important producers of milk for Charleston and Huntington. In Jackson County in 1954 (United States census), 1,605 farms reported 21,316 cattle and calves. A total of 7,071 milk cows were reported on 1,432 farms. In Mason County, 1,416 farms reported 22,702 cattle and calves, and 1,238 farms reported 8,296 milk cows.

The acreages of the principal crops reported by the United States census for stated years are shown in table 9.

TABLE 9.—*Acreage of the principal crops in stated years*

Crop	1899	1949	1954
JACKSON COUNTY			
Corn	26, 919	7, 254	5, 750
Wheat	19, 775	1, 258	488
Oats	1, 224	129	323
Tobacco	325	77	106
Alfalfa and alfalfa mixtures	[1] 1, 584	3, 029	6, 721
MASON COUNTY			
Corn	26, 049	10, 981	11, 111
Wheat	25, 203	3, 124	2, 053
Oats	1, 023	672	853
Tobacco	126	526	486
Alfalfa and alfalfa mixtures	[1] 1, 573	3, 815	5, 878

[1] Alfalfa was not grown in 1899; therefore the figure refers to clover mixtures.

Industrial Development

Jackson and Mason Counties are especially well situated for industrial development and expansion. The two counties are on the Ohio River, which has an excellent system of locks for barge transportation. The Kanawha River is also navigable to above Charleston. Good railroad and road systems serve the area. There are large areas that are suitable for industrial development, especially on the terraces of the Ohio River. Adequate water for industry along the Ohio River is available. Coal deposits and some salt deposits (*3*) are at hand or nearby. Local climate is not rigorous.

In the past decade, there has been much industrial expansion along the Ohio River. Many plants have located here or have taken options on fairly large tracts of land along the river. As a result of this expansion, valuable cropland is being taken out of agricultural use. This trend seems likely to continue along the Ohio River and to a lesser extent along the Kanawha River.

The employment provided by this industrial expansion has lessened the intensity of farming in Jackson and Mason Counties, especially on the smaller general farms.

Climate

Jackson and Mason Counties have a warm temperate climate. Precipitation is well distributed throughout the year. The rainfall in June and July is considerably above the monthly average. August has about average rainfall, which is especially important to pasture production. Table 10 shows the annual temperature and precipitation at Ravenswood Dam 22, Jackson County, and Point Pleasant, Mason County.

Intense summer thundershowers of short duration occur. Weather records reveal that about once in 2 years, a 5-minute rainfall of 0.42 inch can be expected and every 2 years, a 10-minute rainfall of about 0.70 inch occurs. Slightly over an inch of rain may be expected in 10 minutes once in 25 years. A half-hour rain of about 1.1 inches can be expected about every other year. Because of these intensive storms, cultivated areas should have a ground cover and conservation practices that limit runoff and erosion should be used.

Total snowfall is less than 20 inches a year. Usually it remains on the ground for only short periods and therefore furnishes little ground cover or protection. Alternate freezing and thawing in winter is very common and accelerates runoff and erosion. Average winter temperatures are above freezing, but short, cold spells occur. Summers are quite warm and have frequent hot spells.

The average growing season, in areas along the Ohio River, is 164 days (April 30 to October 11) according to records at Ravenswood and 176 days (April 23 to October 16) according to records at Point Pleasant (*9*). At Ravenswood the latest frost recorded in spring was May 27 and the earliest in autumn was September 24; at Point Pleasant the latest in spring was April 23 and the earliest in autumn was September 23. Growing seasons on the uplands, which are 200 to 300 feet higher in elevation, can be expected to be slightly shorter.

Permanent pastures furnish grazing somewhat longer than the average growing seasons recorded at Ravenswood and Point Pleasant. Warm spells often occur after the first killing frost.

Analyses of Soils

Samples for laboratory studies were taken, by horizons, of two profiles each of Huntington, Lakin, Markland, Monongahela, Upshur, Vandalia, and Wheeling

TABLE 10.—*Temperature and precipitation at Ravenswood Dam 22, Jackson County, and Point Pleasant, Mason County, W. Va.*

[Ravenswood Dam 22, Jackson County, elevation, 584 feet]

Month	Temperature [1]			Precipitation [2]			
	Average	Absolute maximum	Absolute minimum	Average	Driest year (1930)	Wettest year (1935)	Average snowfall
	° F.	° F.	° F.	Inches	Inches	Inches	Inches
December	37.9	77	−12	3.32	2.49	3.49	3.5
January	35.4	77	−22	3.60	2.18	3.28	2.9
February	38.8	78	−14	2.97	2.75	1.98	3.0
Winter	37.4	78	−22	9.89	7.42	8.75	9.4
March	43.3	84	−9	3.89	3.20	5.61	2.6
April	53.8	91	20	3.16	1.47	2.38	.1
May	61.9	98	25	3.71	1.36	6.99	0
Spring	53.0	98	−9	10.76	6.03	14.98	2.7
June	70.5	100	35	4.14	1.65	5.72	0
July	75.1	109	44	4.02	1.41	7.96	0
August	72.9	105	42	3.35	2.83	6.22	0
Summer	72.8	109	35	11.51	5.89	19.90	0
September	69.4	103	30	2.30	.86	3.01	0
October	56.3	92	19	2.79	1.39	4.16	0
November	45.7	86	7	2.72	1.28	2.13	1.0
Fall	57.1	103	7	7.81	3.53	9.30	1.0
Year	55.1	109	−22	39.97	22.87	52.93	13.1

[Point Pleasant, Mason County, elevation, 569 feet]

Month	Temperature [1]			Precipitation [2]			
	Average	Absolute maximum	Absolute minimum	Average	Driest year (1930)	Wettest year (1890)	Average snowfall
	° F.	° F.	° F.	Inches	Inches	Inches	Inches
December	35.8	74	−19	3.50	2.90	4.26	3.7
January	34.1	78	−18	3.95	2.16	4.01	5.1
February	33.4	79	−26	3.15	3.23	6.08	4.5
Winter	34.4	79	−26	10.60	8.29	14.35	13.3
March	45.2	88	−1	4.09	3.35	7.54	3.1
April	54.9	95	12	3.31	1.45	5.05	.5
May	64.7	98	29	3.99	2.75	5.58	(3)
Spring	54.9	98	−1	11.39	7.55	18.17	3.6
June	72.4	104	39	4.08	1.71	2.82	(3)
July	76.4	106	41	4.14	1.89	4.48	(3)
August	74.7	106	44	3.21	2.33	10.26	0
Summer	74.5	106	39	11.43	5.93	17.56	(3)
September	65.9	102	30	2.41	.68	5.83	0
October	57.2	94	19	2.81	1.16	4.20	(3)
November	45.3	85	2	2.83	1.64	2.97	.9
Fall	56.1	102	2	8.05	3.48	13.00	.9
Year	55.0	106	−26	41.47	25.25	63.08	17.8

[1] Ravenswood Dam 22: Average temperature based on a 32-year record, through 1955; highest temperature based on a 21-year record and lowest temperature on a 22-year record, through 1952. Point Pleasant: Average temperature based on a 59-year record, through 1953; highest and lowest temperatures on a 60-year record, through 1952.

[2] Ravenswood Dam 22: Average precipitation based on a 40-year record, through 1955; wettest and driest years based on a 39-year record, in the period 1916–1955; snowfall based on an 11-year record, through 1952. Point Pleasant: Average precipitation based on a 63-year record, through 1953; wettest and driest years based on a 64-year record, in the period 1890–1953; snowfall based on a 59-year record, through 1952.

[3] Trace.

soils, and of three profiles of Muskingum soils. Analyses were made by standard methods in use in the Soil Survey Laboratories, Soil Conservation Service. Physical and chemical characteristics of the soils sampled are given in table 11. There follows a description of the horizons sampled in each soil. Unless otherwise indicated, all colors given in the profiles are for moist soil.

Huntington silt loam, S57WVa-27-1-(1-6).—Sampled in a cultivated field, 5 miles south of Point Pleasant on Route 2, ½ mile west of highway, Mason County. The B horizon is more strongly developed than in a normal alluvial soil but is typical of Huntington soils along the Ohio River in West Virginia.

Soil profile:

A_p 0 to 11 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; very friable when moist; pH 7.0; clear boundary.

C_1 11 to 22 inches, dark-brown (10YR 4/3) fine silt loam; weak, fine, subangular blocky structure; friable when moist; pH 6.9; clear, smooth boundary.

C_2 22 to 31 inches, dark-brown coarse silty clay loam; ped faces coated with dark grayish brown (10YR 4/2); moderate, medium, subangular blocky structure; firm when moist; pH 6.0; gradual, wavy boundary.

C_3 31 to 44 inches, dark yellowish-brown (10YR 4/4) fine silty clay loam with ped coatings of dark brown (10YR 4/3); moderate, medium, subangular blocky structure, arranged in very weak, coarse prisms; firm when moist; pH 5.4; gradual, wavy boundary.

C_4 44 to 60 inches, dark yellowish-brown (10YR 4/4) silty clay loam to sandy clay loam with weak, coarse, subangular blocky structure; firm when moist; numerous root channels, pores, and worm casts to the bottom of this horizon; pH 5.6; gradual, wavy boundary.

C_5 60 to 148 inches +, dark yellowish-brown (10YR 4/4) lenses and layers of structureless loam, fine sandy loam, and loamy fine sand; pH 5.0.

Huntington silt loam, S57WVa-27-2-(1-6).—Sampled in a cultivated field, 1½ miles north of Point Pleasant, ½ mile west of W. Va. Route 62, and 600 feet east of Ohio River, Mason County. The B horizon is unusually thick and well developed for an alluvial soil but is typical of the Huntington soils in the county.

Soil profile:

A_p 0 to 11 inches, dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; very friable when moist; pH 6.5; clear, smooth boundary.

TABLE 11.—*Mechanical and chemical*

Soil type and sample number	Depth	Horizon	Particle size distribution: Very coarse sand (2.0–1.0 mm.)	Coarse sand (1.0–0.5 mm.)	Medium sand (0.5–0.25)	Fine sand (0.25–0.10)	Very fine sand (0.10–0.05)	Silt (0.05–0.002)	Clay (less than 0.002)	Greater than 2 mm.	Textural class	Reaction (1:1)	Organic carbon
	Inches		*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*		*pH*	*Percent*
Huntington silt loam: S57WVa-27-1-(1-6).	0 – 11	A_p	0. 3	0. 4	0. 7	3. 2	9. 2	60. 7	25. 5	(1)	Silt loam	6. 6	2. 36
	11 – 22	B_1	------	. 1	. 2	2. 6	9. 4	59. 7	28. 0	(1)	Silty clay loam.	6. 9	1. 44
	22 – 31	B_{21}	------	. 1	. 1	. 5	6. 5	61. 0	31. 8	-------	Silty clay loam.	6. 2	. 62
	31 – 44	B_{22}	. 1	. 1	. 1	. 6	11. 3	58. 6	29. 2	-------	Silty clay loam.	5. 3	. 40
	44 – 60	B_3	------	------	------	. 8	11. 1	58. 5	29. 6	-------	Silty clay loam.	5. 3	. 38
	60 –148+	C	------	------	. 2	18. 4	25. 4	37. 4	18. 6	-------	Loam	5. 0	. 26
Huntington silt loam: S57WVa-27-2-(1-6).	0 – 11	A_p	------	. 3	3. 1	15. 0	12. 0	46. 6	23. 0	-------	Loam	6. 3	1. 67
	11 – 20	B_1	------	. 1	. 9	15. 2	17. 9	44. 5	21. 4	-------	Loam	6. 3	1. 03
	20 – 35	B_{21}	------	------	------	1. 8	15. 5	54. 1	28. 6	-------	Silty clay loam.	6. 1	. 83
	35 – 47	B_{22}	------	------	------	1. 7	15. 1	53. 9	29. 3	-------	Silty clay loam.	5. 7	. 66
	47 – 57	B_3	------	------	------	1. 5	15. 2	56. 7	26. 6	-------	Silt loam	5. 5	. 50
	57 –102+	C	------	------	------	4. 8	21. 0	50. 5	23. 7	-------	Silt loam	5. 7	. 35
Lakin loamy fine sand: S57WVa-18-3-(1-6).	0 – 8	A_p	. 1	2. 6	8. 1	29. 3	20. 3	33. 3	6. 3	(1)	Fine sandy loam to very fine sandy loam.	4. 9	1. 08
	8 – 12	A_2	------	2. 9	9. 1	35. 4	22. 0	25. 7	4. 9	-------	Fine sandy loam.	5. 2	. 23
	12 – 17	A_3	------	2. 5	8. 5	39. 1	26. 0	18. 0	5. 9	(1)	Loamy fine sand.	5. 4	. 13
	17 – 31	B_2	------	1. 2	8. 1	49. 3	26. 9	6. 8	7. 7	-------	Loamy fine sand.	5. 5	. 09
	31 – 41	B_3	------	1. 2	10. 6	53. 1	23. 7	5. 0	6. 4	-------	Fine sand	5. 1	. 06
	41 – 60+	C	------	1. 7	12. 4	53. 3	24. 8	4. 6	3. 2	-------	Fine sand	5. 1	. 02
Lakin loamy fine sand: S57WVa-27-6-(1-6).	0 – 10	A_p	------	2. 0	16. 3	47. 7	14. 5	16. 1	3. 4	(1)	Loamy fine sand.	6. 0	. 88
	10 – 19	A_2/B_1	------	2. 1	20. 5	45. 7	8. 4	17. 9	5. 4	(1)	Loamy fine sand.	6. 4	. 18
	19 – 31	B_{21}	------	1. 9	22. 0	45. 3	5. 9	17. 0	7. 9	-------	Fine sandy loam.	5. 7	. 06
	31 – 44	B_{22}	------	1. 9	23. 5	49. 9	4. 5	11. 1	9. 1	-------	Loamy fine sand to fine sandy loam.	5. 0	. 08
	44 – 57	C_1	------	2. 8	36. 3	48. 3	5. 4	2. 9	4. 3	-------	Sand	5. 1	. 04
	57+	C_2	------	2. 0	22. 5	55. 4	12. 9	3. 1	4. 1	-------	Fine sand	} 5. 1	. 06
Rounded lumps of material from the C_2 horizon:			------	2. 0	25. 5	48. 0	10. 3	4. 2	10. 0	-------	Loamy sand	}	
Markland silt loam: S57WVa-18-6-(1-7).	0 – 7	A_p	1. 0	3. 2	3. 2	4. 6	3. 1	63. 6	21. 3	(1)	Silt loam	6. 0	1. 86
	7 – 11	A_2	1. 1	3. 0	3. 3	3. 6	2. 7	64. 4	21. 9	(1)	Silt loam	4. 9	. 50
	11 – 15	B_1	. 4	1. 6	1. 7	2. 2	1. 9	61. 0	31. 2	(1)	Silty clay loam.	4. 9	. 26
	15 – 21	B_{21g}	------	. 4	. 4	. 8	1. 1	57. 0	40. 3	-------	Silty clay	5. 0	. 21
	21 – 29	B_{22g}	------	. 1	. 1	. 3	. 8	57. 9	40. 8	-------	Silty clay	5. 1	. 18
	29 – 34	B_3	------	------	. 1	. 3	. 6	61. 6	37. 4	-------	Silty clay loam.	7. 1	. 18
	34+	C	------	------	. 1	. 3	. 8	65. 0	33. 8	(1)	Silty clay loam.	7. 5	. 18
Markland silt loam: S57WVa-27-7-(1-6).	0 – 8	A_p	. 4	1. 3	1. 0	1. 6	2. 7	66. 8	26. 2	(1)	Silt loam	6. 9	1. 10
	8 – 12	A_3	. 1	. 6	. 6	1. 1	1. 7	56. 9	39. 0	-------	Silty clay loam.	4. 8	. 25
	12 – 16	B_1	. 1	. 3	. 3	. 7	1. 1	49. 5	48. 0	-------	Silty clay	4. 9	. 19
	16 – 25	B_{21g}	------	------	. 1	. 3	. 7	49. 3	49. 6	-------	Silty clay	4. 8	. 20
	25 – 33	B_{22g}	. 1	. 3	. 4	1. 0	2. 1	54. 2	41. 9	(1)	Silty clay	5. 8	. 24
	33 – 50+	C_{ca}	. 1	------	. 1	. 4	. 9	64. 0	34. 5	(1)	Silty clay loam.	7. 6	. 18

See footnote at end of table.

analyses of selected soils

Nitrogen	C/N ratio	Free iron oxide (Fe_2O_3)	Bulk density	Moisture held: 1/10 atmos.	Moisture held: 1/3 atmos.	Moisture held: 15 atmos.	Cation exchange capacity (NH_4Ac)	Extractable cations (meq./100 g.): Ca	Mg	H	Na	K	Base saturation	Saturation extract: Base saturation	Sum of extractable bases	Sum of extractable cations	Ca/Mg ratio
Percent		*Percent*		*Percent*	*Percent*	*Percent*	*meq./100 g.*						*Percent*	*Percent*	*meq./liter*	*meq./liter*	
0. 186	12. 7	3. 8	1. 12	42. 4	35. 1	11. 5	15. 8	11. 6	3. 3	6. 9	0. 1	0. 2	96	69	15. 2	22. 1	3. 5
. 135	10. 7	3. 7	1. 28	40. 1	33. 2	11. 6	15. 4	11. 2	3. 6	6. 0	-----	. 2	97	71	15. 0	21. 0	3. 1
. 080	8	3. 5	1. 45	36. 5	31. 2	13. 1	15. 7	11. 2	2. 8	7. 8	. 1	. 2	91	65	14. 3	22. 1	4. 0
--------	------	3. 5	1. 52	36. 5	31. 5	12. 3	13. 7	8. 5	2. 1	9. 2	-----	. 2	79	54	10. 8	20. 0	4. 0
--------	------	3. 6	1. 50	39. 3	32. 4	12. 6	14. 8	9. 3	2. 6	9. 2	-----	. 2	82	57	12. 1	21. 3	3. 6
--------	------	2. 9	------	32. 3	26. 3	8. 4	10. 0	5. 0	1. 2	7. 3	-----	. 1	63	46	6. 3	13. 6	4. 2
. 142	11. 8	4. 0	1. 31	38. 5	30. 2	10. 1	13. 4	9. 3	1. 6	7. 8	-----	. 2	83	59	11. 1	18. 9	5. 8
. 105	9. 8	2. 8	1. 40	34. 2	26. 5	8. 9	12. 6	9. 2	1. 6	6. 4	-----	. 2	87	63	11. 0	17. 4	5. 8
. 094	9	3. 3	1. 43	36. 3	29. 7	11. 8	15. 2	10. 2	1. 8	7. 8	-----	. 2	80	61	12. 2	20. 0	5. 7
--------	------	3. 4	1. 48	37. 4	30. 2	11. 8	14. 4	9. 4	1. 6	8. 3	-----	. 2	78	57	11. 2	19. 5	5. 9
--------	------	3. 4	1. 38	35. 1	29. 0	11. 2	13. 9	8. 8	2. 0	7. 8	-----	. 2	79	58	11. 0	18. 8	4. 4
--------	------	3. 2	1. 39	34. 2	27. 3	10. 2	13. 0	9. 2	1. 8	6. 0	-----	. 2	86	65	11. 2	17. 2	5. 1
. 094	11. 5	1. 3	1. 18	24. 4	12. 3	3. 0	5. 0	. 8	. 3	5. 4	-----	. 2	26	19	1. 3	6. 7	2. 7
. 027	8	1. 4	1. 31	16. 2	9. 1	1. 9	2. 4	. 8	. 4	2. 2	-----	. 1	54	37	1. 3	3. 5	2. 0
. 022	6	1. 6	1. 26	13. 4	7. 5	2. 3	2. 7	. 9	. 4	4. 1	-----	. 2	56	27	1. 5	5. 6	2. 2
. 020	4	2. 0	1. 32	11. 2	6. 6	3. 3	3. 5	1. 4	. 9	2. 3	-----	. 2	71	52	2. 5	4. 8	1. 6
--------	------	1. 8	1. 34	9. 8	5. 3	2. 8	3. 0	. 7	. 8	2. 3	-----	. 2	57	42	1. 7	4. 0	. 9
--------	------	1. 5	1. 26	7. 4	3. 7	1. 6	1. 9	. 4	. 6	1. 4	-----	. 2	63	46	1. 2	2. 6	. 7
. 067	13	1. 1	1. 16	12. 2	7. 3	2. 3	3. 0	1. 6	. 5	2. 7	-----	. 3	80	47	2. 4	5. 1	3. 2
. 022	8	1. 3	1. 29	11. 7	7. 6	2. 1	2. 6	1. 2	. 8	. 9	-----	. 2	85	71	2. 2	3. 1	1. 5
. 011	5	1. 5	1. 31	11. 8	8. 9	3. 0	3. 1	. 8	1. 0	1. 8	-----	. 3	68	54	2. 1	3. 9	. 8
--------	------	1. 8	1. 34	10. 1	7. 5	3. 4	3. 8	1. 1	. 9	2. 7	-----	. 4	63	47	2. 4	5. 1	1. 2
--------	------	1. 4	1. 28	5. 1	3. 6	1. 8	2. 3	. 9	. 2	. 9	-----	. 2	56	59	1. 3	2. 2	4. 5
--------	------	1. 5	------	6. 9	3. 8	1. 8	2. 4	1. 0	. 2	1. 8	-----	. 2	58	44	1. 4	3. 2	5. 0
. 171	10. 9	2. 5	1. 18	39. 0	31. 6	8. 0	12. 1	6. 7	2. 2	7. 3	. 1	. 2	76	56	9. 2	16. 5	3. 0
. 065	8	2. 8	1. 33	34. 2	28. 5	7. 6	14. 2	1. 9	. 4	15. 0	. 1	. 1	31	14	2. 5	17. 5	4. 8
. 048	5	3. 7	1. 41	36. 6	29. 7	12. 2	10. 5	1. 0	1. 1	12. 3	. 3	. 2	25	17	2. 6	14. 9	. 9
. 050	4	3. 8	1. 34	38. 5	31. 8	16. 7	14. 8	. 8	4. 1	14. 7	1. 0	. 2	41	29	6. 1	20. 8	. 2
. 046	4	3. 5	1. 50	37. 5	30. 8	16. 0	14. 4	1. 4	8. 4	12. 8	1. 5	. 2	80	47	11. 5	24. 3	. 2
--------	------	3. 4	1. 50	37. 3	31. 3	14. 9	15. 2	2. 3	11. 5	5. 5	2. 5	. 2	100	75	16. 5	22. 0	. 2
--------	------	3. 3	1. 35	36. 8	31. 1	13. 5	14. 3	2. 4	10. 9	3. 2	2. 7	. 2	100	84	16. 2	19. 4	. 2
. 118	9. 3	2. 4	1. 46	37. 4	30. 0	9. 0	10. 6	6. 4	3. 4	3. 6	. 1	. 2	95	74	10. 1	13. 7	1. 9
. 055	4	3. 4	1. 43	39. 0	31. 8	15. 1	12. 6	1. 7	2. 4	13. 3	. 2	. 2	36	25	4. 5	17. 8	. 7
. 053	4	3. 6	1. 38	38. 6	32. 6	18. 3	16. 2	1. 3	3. 4	17. 0	. 4	. 3	33	24	5. 4	22. 4	. 4
. 050	4	3. 2	1. 42	40. 3	35. 5	19. 3	18. 7	1. 6	5. 4	17. 5	. 7	. 3	43	31	8. 0	25. 5	. 3
--------	------	2. 9	1. 52	37. 1	32. 0	16. 2	18. 5	4. 4	10. 8	6. 0	1. 3	. 2	90	74	16. 7	22. 7	. 4
--------	------	2. 9	------	35. 6	32. 6	13. 4	14. 7	4. 7	9. 4	2. 3	1. 2	. 2	100	87	15. 5	17. 8	. 5

TABLE 11.—*Mechanical and chemical*

Soil type and sample number	Depth	Horizon	Particle size distribution: Very coarse sand (2.0–1.0 mm.)	Coarse sand (1.0–0.5 mm.)	Medium sand (0.5–0.25)	Fine sand (0.25–0.10)	Very fine sand (0.10–0.05)	Silt (0.05–0.002)	Clay (less than 0.002)	Greater than 2 mm.	Textural class	Reaction (1:1)	Organic carbon
	Inches		*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*		*pH*	*Percent*
Monongahela silt loam: S57WVa-27-5-(1-7).	0 – 8	A_p	0. 5	1. 3	0. 8	4. 9	3. 3	74. 0	15. 2	-------	Silt loam	6. 9	0. 85
	8 – 10½	A_2	. 4	1. 2	. 7	3. 7	2. 6	73. 9	17. 5	-------	Silt loam	6. 2	. 46
	10½ – 20	B_2	. 2	. 7	. 5	2. 7	2. 3	71. 0	22. 6	-------	Silt loam	4. 7	. 14
	20 – 28	B_3	. 1	. 4	. 4	4. 0	2. 8	66. 9	25. 4	-------	Silt loam	4. 7	. 09
	28 – 41	B_{31gm}	. 3	. 5	. 6	8. 2	4. 6	64. 5	21. 3	-------	Silt loam	4. 9	. 05
	41 – 52	B_{32gm}	. 4	. 5	. 5	5. 3	2. 5	58. 2	32. 6	-------	Silty clay loam.	5. 0	. 06
	52 – 60+	D	. 7	. 9	. 6	6. 0	2. 0	50. 0	39. 8	[1]	Silty clay loam.	5. 0	. 05
Monongahela silt loam: S57WVa-18-4-(1-8).	0 – 8	A_p	1. 1	1. 7	. 9	1. 5	1. 6	76. 7	16. 5	[1]	Silt loam	6. 2	1. 00
	8 – 13	A_2	1. 7	1. 8	. 7	1. 3	1. 3	72. 4	20. 8	-------	Silt loam	5. 1	. 18
	13 – 18	A_3	. 7	1. 2	. 6	1. 3	1. 5	71. 1	23. 6	-------	Silt loam	5. 0	. 13
	18 – 22	B_1	. 6	1. 2	. 7	1. 8	1. 7	68. 6	25. 4	-------	Silt loam	5. 2	. 10
	22 – 32	B_{21gm}	. 7	1. 4	. 9	2. 2	2. 1	62. 9	29. 8	[1]	Silty clay loam.	5. 0	. 10
	32 – 40	B_{22gm}	. 9	2. 0	1. 2	2. 7	1. 8	62. 6	28. 8	[1]	Silty clay loam.	5. 2	. 06
	40 – 48	B_3	. 1	. 6	. 6	1. 5	1. 3	46. 7	49. 2	[1]	Silty clay	5. 2	. 06
	48 – 108+	D_u	------	------	------	------	------	32. 9	67. 1	-------	Clay	7. 4	. 06
Muskingum sandy loam: S57WVa-27-8-(1-7).	0 – 3	A_1	1. 5	7. 4	23. 6	23. 8	4. 5	30. 3	8. 9	1. 2	Sandy loam	5. 7	2. 46
	3 – 4½	A_2	1. 1	6. 6	23. 7	23. 3	5. 2	31. 6	8. 5	[1]	Sandy loam	5. 2	. 81
	4½ – 6	A_3	. 4	5. 9	22. 8	21. 5	6. 0	33. 0	10. 4	[1]	Fine sandy loam.	5. 4	. 38
	6 – 12	B_1	. 5	7. 4	23. 6	23. 5	4. 6	28. 9	11. 5	[1]	Sandy loam	5. 3	. 18
	12 – 19	B_{21}	. 6	8. 6	24. 6	24. 2	4. 8	22. 8	14. 4	[1]	Sandy loam	5. 0	. 18
	19 – 26	B_{22}	. 5	8. 2	22. 1	28. 9	5. 5	16. 2	18. 6	[1]	Sandy loam	4. 8	. 13
	26 – 30	C	. 9	16. 0	29. 4	24. 0	5. 0	13. 2	11. 5	[1]	Coarse sandy loam.	4. 8	. 13
Muskingum silt loam: S57WVa-3-1-(1-6).	0 – 4	A_1	3. 8	7. 9	10. 4	18. 0	8. 8	34. 8	16. 3	3. 4	Loam	5. 5	2. 46
	4 – 6	A_2	2. 5	6. 1	9. 6	16. 4	9. 7	37. 3	18. 4	4. 7	Loam	4. 7	1. 22
	6 – 10	B_1	4. 5	9. 4	10. 6	17. 6	8. 7	31. 3	17. 9	[1]	Loam	4. 7	. 42
	10 – 20	B_2	3. 8	9. 5	10. 9	17. 2	8. 1	29. 6	20. 9	4. 9	Loam	5. 0	. 22
	20 – 26	B_3	6. 3	11. 0	9. 7	13. 6	6. 7	30. 9	21. 8	20. 3	Loam	5. 0	. 20
	26 – 30	C	8. 5	11. 1	9. 6	13. 9	7. 1	29. 4	20. 4	14. 6	Loam	4. 9	. 13
Muskingum silt loam: S57WVa-18-8-(1-5). (Boone County.)	0 – 2	A_p	3. 2	2. 8	1. 4	3. 0	17. 0	57. 3	15. 3	3. 0	Silt loam	5. 0	2. 07
	2 – 3½	A_2	2. 9	4. 0	1. 9	1. 5	18. 9	56. 3	14. 5	5. 8	Silt loam	4. 8	. 84
	3 – 8	B_2	2. 1	12. 6	8. 0	5. 8	13. 8	42. 3	15. 4	1. 3	Loam	4. 5	. 27
	8 – 11	B_3	3. 0	23. 4	14. 1	6. 6	9. 0	30. 3	13. 6	[1]	Coarse sandy loam.	4. 6	. 18
	11 – 24	C	2. 9	30. 5	15. 3	11. 6	7. 4	20. 3	12. 0	[1]	Coarse sandy loam.	4. 7	. 10
Upshur clay loam: S57WVa-18-2-(1-7).	0 – 3	A_{p1}	. 4	. 1	. 2	. 7	1. 0	41. 8	55. 8	-------	Silty clay	4. 8	2. 68
	3 – 7	A_{p2}	. 2	. 1	. 1	. 9	1. 2	41. 9	55. 6	-------	Silty clay	5. 1	1. 43
	7 – 17	B_{21}	------	------	. 1	. 3	. 6	27. 6	71. 4	-------	Clay	4. 6	. 66
	17 – 23	B_{22}	------	------	. 1	. 3	. 5	26. 6	72. 5	-------	Clay	4. 5	. 29
	23 – 36	B_3	------	------	. 1	. 6	1. 2	34. 8	63. 3	-------	Clay	5. 0	. 23
	36 – 47	C_1	1. 2	. 7	. 4	. 7	1. 3	51. 9	43. 8	-------	Silty clay	7. 8	. 15
	47 – 60+	C_2	1. 0	. 8	. 4	. 7	1. 6	64. 0	31. 5	[1]	Silty clay loam.	7. 8	. 04
Upshur clay loam: S57WVa-18-5-(1-6).	0 – 7	A_p	. 2	. 4	. 3	. 9	1. 1	44. 8	52. 3	-------	Silty clay	4. 8	1. 66
	7 – 13	B_{21}	------	------	. 1	. 4	. 6	33. 0	65. 9	-------	Clay	4. 9	. 68
	13 – 20	B_{22}	------	------	. 1	. 4	. 6	30. 0	68. 9	-------	Clay	4. 6	. 38
	20 – 30	B_{23}	------	------	. 1	. 7	1. 0	33. 1	65. 1	-------	Clay	4. 7	. 16
	30 – 40	B_3	------	------	. 1	. 7	1. 2	34. 3	63. 7	-------	Clay	4. 8	. 21
	40 – 67	C	. 5	. 2	. 2	4. 1	1. 2	48. 6	45. 2	-------	Silty clay	6. 7	. 10

See footnote at end of table.

analyses of selected soils—Continued

Nitrogen	C/N ratio	Free iron oxide (Fe_2O_3)	Bulk density	Moisture held: 1/10 atmos.	Moisture held: 1/3 atmos.	Moisture held: 15 atmos.	Cation exchange capacity (NH_4Ac)	Extractable cations (meq./100 g.): Ca	Mg	H	Na	K	Base saturation	Saturation extract—: Base saturation	Sum of extractable bases	Sum of extractable cations	Ca/Mg ratio
Percent		*Percent*		*Percent*	*Percent*	*Percent*	*meq./100 g.*						*Percent*	*Percent*	*meq./liter*	*meq./liter*	
0.086	10	1.6	1.44	35.8	26.9	5.8	7.7	5.6	1.1	2.7	-----	0.1	88	72	6.8	9.5	5.1
.057	8	1.9	1.40	35.4	27.8	6.5	6.8	3.8	1.0	3.6	-----	.1	72	58	4.9	8.5	3.8
.027	5	2.6	1.36	34.4	28.7	8.4	8.9	2.6	1.2	7.3	0.1	.2	46	36	4.1	11.4	2.2
.021	4	3.3	1.46	35.7	29.4	10.1	11.6	1.6	.8	10.1	.2	.2	24	22	2.8	12.9	2.0
--------	------	2.4	1.52	30.8	25.7	7.9	9.8	1.3	2.7	8.2	-----	.2	43	34	4.2	12.4	.5
--------	------	2.9	1.64	32.1	27.7	10.9	12.6	2.3	2.7	9.1	.2	.2	43	37	5.4	14.5	.8
--------	------	4.3	1.51	36.8	31.7	14.0	15.2	3.8	5.5	8.7	.3	.2	64	53	9.8	18.5	.7
.092	10.9	2.1	1.20	38.1	27.9	6.3	8.3	4.6	1.1	5.0	.4	.1	75	55	6.2	11.2	4.2
.031	6	2.6	1.46	32.7	26.6	7.4	7.4	2.7	1.4	5.5	.1	.2	59	44	4.4	9.9	1.9
.028	5	3.2	1.42	35.4	28.3	9.1	9.1	2.4	1.5	7.3	.1	.2	46	36	4.2	11.5	1.6
.021	5	3.5	1.50	34.0	27.5	9.6	10.4	2.2	2.2	8.2	.2	.2	46	37	4.8	13.0	1.0
.021	5	3.4	1.52	34.7	28.2	11.4	13.6	2.9	2.4	13.3	.3	.2	43	30	5.8	19.1	1.2
--------	------	2.8	1.68	30.6	26.1	10.0	12.8	3.0	3.2	8.7	.4	.2	53	44	6.8	15.5	.9
--------	------	2.8	1.46	35.6	30.1	15.6	20.0	8.1	7.3	8.3	.5	.3	81	66	16.2	24.5	1.1
--------	------	3.3	------	49.0	41.8	21.2	32.7	17.7	12.6	7.0	1.0	.4	97	82	31.7	38.7	1.4
.171	14.4	1.0	.90	23.8	16.7	4.4	9.2	5.0	1.4	5.4	-----	.4	74	56	6.8	12.2	3.6
.064	13	1.0	1.46	20.2	14.8	3.0	5.2	1.4	.7	4.5	-----	.3	46	35	2.4	6.9	2.0
.031	12	1.1	------	17.9	14.5	3.1	4.1	1.5	.6	3.2	-----	.2	56	42	2.3	5.5	2.5
.022	8	1.4	1.54	17.4	14.0	3.7	4.5	1.7	.8	2.7	-----	.2	60	50	2.7	5.4	2.1
.022	8	1.7	1.56	18.7	14.3	5.3	5.8	1.7	1.1	4.1	-----	.2	52	42	3.0	7.1	1.5
.016	8	2.2	1.49	20.5	14.8	7.4	7.8	1.4	2.4	7.3	-----	.2	51	35	4.0	11.3	.6
--------	------	1.9	1.60	14.8	11.4	5.3	7.0	.6	2.0	6.8	-----	.2	40	29	2.8	9.6	.3
.196	12.6	2.0	------	32.3	24.1	7.5	10.6	4.2	1.2	8.7	-----	.5	56	40	5.9	14.6	3.5
.097	12.6	2.1	------	26.8	20.8	5.9	6.6	.9	.4	8.6	-----	.3	24	16	1.6	10.2	2.2
.046	9	2.6	------	23.7	18.5	6.8	5.8	1.2	.4	6.3	-----	.2	31	22	1.8	8.1	3.0
.037	6	2.6	------	24.5	19.0	7.9	5.9	2.2	.6	5.0	-----	.2	51	38	3.0	8.0	3.7
.033	6	3.3	------	25.5	21.1	8.2	6.3	1.7	1.4	5.0	-----	.3	54	40	3.4	8.4	1.2
--------	------	3.5	------	25.2	21.0	7.3	5.7	1.0	1.2	5.9	-----	.2	42	29	2.4	8.3	.8
.122	17	2.6	------	33.3	24.9	6.8	13.9	5.3	1.8	10.1	-----	.5	55	43	7.6	17.7	2.9
.057	15	2.6	------	27.8	22.3	6.2	11.6	4.1	1.1	9.6	-----	.3	47	36	5.5	15.1	3.7
.023	12	2.3	------	23.4	19.0	5.8	9.2	1.2	.5	9.6	-----	.2	21	16	1.9	11.5	2.4
.017	10	2.0	------	19.8	16.2	5.4	8.5	1.1	.2	8.6	-----	.2	18	15	1.5	10.1	5.5
.010	10	1.9	------	16.6	13.3	5.5	8.0	1.0	.8	7.7	-----	.2	25	21	2.0	9.7	1.2
.176	15.2	4.0	------	43.6	37.7	19.6	39.9	24.6	7.2	15.1	-----	1.0	82	68	32.8	47.9	3.4
.099	14.4	4.2	------	45.8	37.3	19.6	38.6	24.7	7.4	14.6	-----	.6	85	69	32.7	47.3	3.3
.044	15	4.6	------	55.1	43.1	24.5	47.1	28.0	9.7	20.0	.1	.8	82	66	38.6	58.6	2.9
.024	12	4.9	------	53.0	42.3	24.1	46.1	27.1	10.5	17.2	.1	.7	83	69	38.4	55.6	2.6
.020	12	4.5	------	48.1	39.2	21.4	48.4	35.1	12.9	8.1	.1	.6	100	86	48.7	56.8	2.7
--------	------	3.3	------	42.5	33.0	17.7	44.0	47.1	11.0	4.3	.1	.4	100	93	58.6	62.9	4.3
--------	------	3.5	------	38.6	30.8	15.7	42.0	45.4	13.2	3.8	.1	.4	100	94	59.1	62.9	3.4
.108	15.4	4.5	------	48.7	37.2	18.6	34.7	19.5	6.9	15.0	-----	.7	78	64	27.1	42.1	2.8
.047	14	4.9	------	54.6	41.6	22.9	44.4	28.7	9.9	14.7	.1	.6	88	73	39.3	54.0	2.9
.031	12	5.5	------	54.1	42.7	24.3	47.8	24.2	10.9	24.8	.1	.6	75	59	35.8	60.6	2.2
.106	10	5.6	------	48.3	38.7	22.4	45.4	23.9	12.9	17.6	.1	.6	82	68	37.5	55.1	1.8
--------	------	5.0	------	49.3	39.6	21.5	44.9	27.9	13.5	10.5	.2	.6	94	80	42.2	52.7	2.1
--------	------	4.9	------	42.1	33.9	18.5	44.4	31.9	14.6	3.3	.2	.4	100	93	47.1	50.4	2.2

TABLE 11.—*Mechanical and chemical*

Soil type and sample number	Depth	Horizon	Particle size distribution								Textural class	Reaction (1:1)	Organic carbon
			Very coarse sand (2.0–1.0 mm.)	Coarse sand (1.0–0.5 mm.)	Medium sand (0.5–0.25)	Fine sand (0.25–0.10)	Very fine sand (0.10–0.05)	Silt (0.05–0.002)	Clay (less than 0.002)	Greater than 2 mm.			
	Inches		*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*		*pH*	*Percent*
Vandalia silty clay loam: S57WVa-18-1-(1-8).	0 - 3	A_1	3. 0	3. 9	2. 7	7. 4	4. 2	57. 8	21. 0	(1)	Silt loam	5. 4	3. 20
	3 - 6	A_2	3. 5	3. 2	2. 2	6. 7	4. 1	59. 5	20. 8	4. 7	Silt loam	5. 1	1. 61
	6 - 13	B_{21}	1. 8	2. 5	2. 1	6. 6	4. 0	48. 4	34. 6	3. 2	Silty clay loam.	4. 5	. 40
	13 - 24	B_{22}	4. 2	3. 9	2. 8	9. 3	7. 6	45. 4	26. 8	2. 3	Loam	4. 5	. 15
	24 - 33	B_3	3. 2	3. 8	3. 0	11. 5	9. 1	43. 6	25. 8	1. 8	Loam	4. 5	. 07
	33 - 42	C_1	3. 0	3. 9	2. 6	9. 2	8. 1	47. 0	26. 2	. 5	Loam	4. 9	. 06
	42 - 55	C_2	3. 0	4. 6	3. 3	11. 3	8. 5	43. 4	25. 9	4. 1	Loam	5. 1	. 08
	55+	D_u	. 9	1. 4	. 9	3. 5	4. 2	44. 1	45. 0	(1)	Silty clay	5. 2	. 14
Vandalia silty clay loam: S57WVa-18-7-(1-6).	0 - 5	A_p	1. 1	1. 2	. 6	2. 0	4. 8	42. 8	47. 5	(1)	Silty clay	4. 8	. 68
	5 - 16	B_{21}	2. 4	1. 8	. 6	2. 1	8. 4	45. 6	39. 1	3. 8	Silty clay loam.	4. 8	. 16
	16 - 22	B_{22}	2. 4	2. 0	. 7	1. 9	4. 6	43. 1	45. 3	(1)	Silty clay	5. 1	. 11
	22 - 28	B_3	1. 9	1. 9	. 7	2. 1	5. 1	44. 0	44. 3	(1)	Silty clay	5. 6	. 29
	28 - 37	C_1	3. 0	2. 1	. 7	2. 2	5. 1	45. 6	41. 3	(1)	Silty clay	6. 4	. 50
	37 - 50+	C_2	2. 3	1. 8	. 7	2. 0	5. 6	44. 9	42. 7	(1)	Silty clay	7. 0	. 47
Wheeling silt loam: S57WVa-27-3-(1-5).	0 - 11	A_p	. 4	1. 2	1. 4	4. 6	7. 6	70. 7	14. 1	. 6	Silt loam	6. 2	1. 06
	11 - 17	B_1	. 2	. 9	1. 0	2. 8	5. 9	70. 4	18. 8	(1)	Silt loam	5. 0	. 39
	17 - 28	B_{21}	. 1	. 4	. 4	1. 7	7. 9	67. 9	21. 6	-------	Silt loam	4. 7	. 20
	28 - 36	B_{22}	------	. 1	. 2	1. 1	15. 0	65. 2	18. 4	-------	Silt loam	4. 5	. 13
	36 - 72	D_1	------	. 1	. 2	3. 0	32. 0	51. 8	12. 9	-------	Silt loam	4. 9	. 06
Wheeling silt loam: S57WVa-27-4-(1-7).	0 - 9	A_p	. 1	2. 7	5. 9	3. 9	1. 9	71. 7	13. 8	-------	Silt loam	6. 2	1. 18
	9 - 12	A_2	. 1	3. 3	6. 8	4. 2	1. 8	67. 2	16. 6	-------	Silt loam	6. 7	. 28
	12 - 16	B_1	. 1	3. 2	6. 3	3. 8	1. 7	64. 4	20. 5	-------	Silt loam	6. 6	. 18
	16 - 23	B_2	. 1	2. 3	5. 2	3. 1	1. 7	66. 9	20. 7	-------	Silt loam	5. 5	. 10
	23 - 38	B_3	------	4. 1	9. 2	5. 7	1. 4	59. 8	19. 8	-------	Silt loam	4. 7	. 06
	38 - 49	D_1	. 2	11. 0	25. 6	15. 6	1. 3	31. 3	15. 0	-------	Sandy loam	4. 7	. 05
	49 - 72	D_2	. 4	15. 8	35. 9	22. 0	1. 2	12. 2	12. 5	-------	Sandy loam	4. 8	. 04

[1] Trace.

C_1 11 to 20 inches, dark-brown (10YR 4/3) loam; weak, medium, subangular blocky structure; firm when moist; pH 6.6; clear, smooth boundary.

C_2 20 to 35 inches, dark-brown (10YR 4/3) silt loam with coatings of dark grayish brown (10YR 3/3); weak, prismatic structure breaking readily into moderate, medium, subangular blocky peds; friable when moist; pH 6.6; gradual, smooth boundary.

C_3 35 to 47 inches, dark yellowish-brown (10YR 4/4) fine silt loam with coatings of dark grayish brown (10YR 3/3); moderate, medium and coarse, subangular blocky structure; slightly firm when moist; pH 6.2; gradual, wavy boundary.

C_4 47 to 57 inches, dark yellowish-brown silt loam with dark grayish-brown (10YR 3/3) coatings; weak, coarse and medium, subangular blocky structure; slightly firm when moist; pH 5.9; gradual, wavy boundary.

C_5 57 to 102 inches +, silt loam to loam (10YR 3/4) in bands and layers; structureless.

Lakin loamy fine sand, S57WVa-18-3-(1-6).—Sampled in an abandoned pasture, now idle, 5 miles south of Ravenswood near State Route 2, 50 yards north of main entrance road to aluminum plant, Jackson County. The site is a sloping sand dune, 20 to 30 feet high.

Soil profile:

A_p 0 to 8 inches, light loamy fine sand; brown (10YR 5/3) when dry and very dark gray to very dark grayish brown (10YR 3/3) when moist; weak, fine, granular structure; very friable when moist and nonplastic and nonsticky when wet; many fine roots; pH 5.1; abrupt, smooth boundary.

A_2 8 to 12 inches, light loamy fine sand; light yellowish brown (10YR 6/4) when dry and yellowish brown (10YR 5/4) when moist; some coarse lumps easily crushed to weak, fine, granular structure; friable when moist and nonplastic and nonsticky when wet; tendency to weak, thin, platy structure in upper part; pH 5.4; clear, wavy boundary.

A_3 12 to 17 inches, yellowish-brown (10YR 5/4), light loamy fine sand; a few areas have brown to dark-brown (7.5YR 4/4) coarse lumps, ¼ inch in diameter, that break easily to weak, fine, granular structure; except for lumps, matrix is single grain; very friable when moist and nonplastic and nonsticky when wet; pH 5.4; clear, wavy boundary.

B_2 17 to 31 inches, strong-brown (7.5YR 5/6) to yellowish-brown (10YR 5/6) loamy fine sand; brown to dark-brown (7.5YR 4/4), somewhat firm, subangular blocky lumps of fine sandy loam are common; lumps are ¼ to 2 inches in diameter and occur in horizontal bands; coarse lumps break easily to weak, fine, granular structure; except for lumps, soil is single grain; very friable when moist; few, fine, soft concretions of manganese or iron; pH 5.7; gradual, wavy boundary.

B_3 31 to 41 inches, yellowish-brown (10YR 5/4) fine sand; single grain; loose when moist; 15 percent of horizon consists of dark-brown (7.5YR 3/4), slightly firm, massive lumps of fine sandy loam; lumps are 1 to 2 inches in diameter and occur in irregular bands 1 to 2 inches thick; few, faint clay bridgings on sand in lumps; few, small manganese coatings; gradual, wavy boundary.

analyses of selected soils—Continued

Nitrogen	C/N ratio	Free iron oxide (Fe_2O_3)	Bulk density	Moisture held			Cation exchange capacity (NH_4A_c)	Extractable cations (meq./100 g.)					Base saturation	Saturation extract—			
				1/10 atmos.	1/3 atmos.	15 atmos.		Ca	Mg	H	Na	K		Base saturation	Sum of extractable bases	Sum of extractable cations	Ca/Mg ratio
Percent		*Percent*		*Percent*	*Percent*	*Percent*	*meq./100 g.*						*Percent*	*Percent*	*meq./liter*	*meq./liter*	
0. 234	13. 7	2. 1	------	39. 3	30. 8	9. 6	17. 5	7. 8	3. 7	12. 8	-----	0. 4	68	48	11. 9	24. 7	2. 1
. 125	12. 9	2. 3	------	33. 8	26. 8	8. 3	13. 1	4. 3	1. 8	12. 4	-----	. 3	49	34	6. 4	18. 8	2. 4
. 047	8	3. 3	------	32. 7	27. 0	12. 1	16. 0	3. 3	2. 0	15. 6	0. 1	. 2	35	26	5. 6	21. 2	1. 6
. 029	5	3. 3	------	29. 9	25. 0	10. 2	14. 9	. 8	2. 1	17. 0	-----	. 2	21	15	3. 1	20. 1	. 4
-------	------	3. 1	------	28. 5	24. 2	9. 6	14. 4	. 8	2. 9	14. 2	. 1	. 2	28	22	4. 0	18. 2	. 3
-------	------	2. 9	------	28. 1	21. 5	9. 3	14. 9	1. 9	3. 5	14. 7	. 2	. 2	39	28	5. 8	20. 5	. 5
-------	------	3. 0	------	27. 7	22. 0	9. 4	15. 3	3. 6	4. 9	10. 1	. 3	. 2	59	47	9. 0	19. 1	. 7
-------	------	4. 5	------	36. 5	29. 9	16. 1	25. 2	11. 0	10. 9	8. 4	. 8	. 4	92	73	23. 1	31. 5	1. 0
. 067	10	3. 4	------	35. 9	27. 4	15. 1	23. 1	11. 8	4. 4	13. 4	. 1	. 5	73	56	16. 8	30. 2	2. 7
. 019	8	3. 2	------	33. 1	24. 3	12. 5	21. 3	11. 1	4. 6	11. 1	. 2	. 4	76	59	16. 3	27. 4	2. 4
. 026	4	3. 5	------	33. 9	26. 4	14. 6	24. 7	16. 0	6. 7	9. 3	. 3	. 5	95	72	23. 5	32. 8	2. 4
. 020	14	3. 5	------	34. 4	26. 7	14. 5	25. 5	17. 9	6. 6	6. 0	. 3	. 4	99	81	25. 2	31. 2	2. 7
-------	------	3. 5	------	34. 8	27. 1	14. 6	25. 9	18. 8	7. 0	6. 0	. 3	. 4	100	82	26. 5	32. 5	2. 7
-------	------	3. 3	------	34. 8	28. 4	15. 1	26. 4	20. 3	6. 8	3. 7	. 3	. 4	100	88	27. 8	31. 5	3. 0
. 102	10. 4	1. 6	1. 21	34. 4	24. 4	5. 8	8. 5	5. 0	1. 3	6. 8	-----	. 3	78	49	6. 6	13. 4	3. 8
. 046	8	2. 1	1. 45	34. 9	25. 9	7. 0	7. 2	3. 1	. 7	5. 5	-----	. 2	56	42	4. 0	9. 5	4. 4
. 037	5	2. 9	1. 49	36. 4	26. 9	9. 3	8. 8	3. 2	. 6	7. 8	-----	. 2	45	34	4. 0	11. 8	5. 3
-------	------	2. 9	1. 38	37. 2	24. 8	8. 5	8. 2	2. 9	. 7	7. 8	-----	. 2	46	33	3. 8	11. 6	4. 1
-------	------	2. 6	1. 40	34. 8	18. 9	6. 3	6. 7	2. 4	1. 0	5. 0	-----	. 2	54	42	3. 6	8. 6	2. 4
. 107	11	1. 2	1. 30	36. 6	23. 8	5. 3	8. 1	4. 5	1. 2	4. 1	-----	. 3	74	59	6. 0	10. 1	3. 8
. 039	7	1. 4	1. 35	30. 4	23. 6	5. 8	5. 8	3. 0	1. 2	2. 7	-----	. 1	74	61	4. 3	7. 0	2. 5
. 034	5	1. 9	1. 44	30. 9	24. 1	7. 5	6. 9	3. 4	1. 7	2. 3	-----	. 2	77	70	5. 3	7. 6	2. 0
. 039	2	2. 2	1. 38	33. 8	26. 8	8. 0	7. 4	3. 1	1. 8	4. 6	-----	. 2	69	52	5. 1	9. 7	1. 7
. 024	2	2. 6	1. 64	33. 9	26. 0	7. 7	8. 3	2. 0	1. 8	7. 3	-----	. 2	48	35	4. 0	11. 3	1. 1
-------	------	2. 1	1. 72	24. 2	17. 3	5. 6	6. 5	1. 4	1. 4	5. 4	-----	. 2	46	36	3. 0	8. 4	1. 0
-------	------	1. 7	1. 55	16. 4	9. 5	4. 4	4. 9	. 8	1. 1	4. 5	-----	. 2	43	32	2. 1	6. 6	. 7

C 41 to 60 inches +, yellowish-brown (10YR 5/4) to dark-brown (10YR 4/3) fine sand (sand is clean); irregular bands 1 to 2 inches thick; firm, massive lumps 1 to 2 inches in diameter; loose when moist; pH 5.4.

Lakin loamy fine sand, S57WVa-27-6-(1-6).—Sampled in an idle, formerly cultivated field in TNT area, 500 feet west of Western Patrol Road, Mason County. Slope, 4 percent.

Soil profile:

A_p 0 to 10 inches, loamy fine sand; brown (10YR 5/3) when dry and very dark grayish brown (10YR 3/2) when moist; single grain; very friable when moist; numerous fine grass and weed roots; pH 6.4; abrupt, smooth boundary.

A_2 or B_1 10 to 19 inches, loamy fine sand; light yellowish brown (10YR 6/4) when dry, yellowish brown (10YR 5/4) when moist; arranged as very weak, coarse, subangular blocky peds that break very easily into single grains; peds or lump faces are brown to dark brown (10YR 4/3); horizon contains a few ¼- to ½-inch spots of slightly darker loamy fine sand; very friable when moist; pH 6.8; clear, wavy boundary.

B_{21} 19 to 31 inches, dark yellowish-brown (10YR 4/4) to yellowish-brown (10YR 5/6) loamy fine sand; very weak, fine, granular and very weak, coarse subangular blocky peds or lumps; lumps break very easily to single-grain material; very friable when moist; horizon contains 1 to 2 percent soft manganese and iron concretions that are very dark brown to black and ¼- to ½-inch in diameter; a few, faint, thin patches of clay film; pH 7.2; boundary is arbitrary for sampling purposes.

B_{22} 31 to 44 inches, this layer is a continuation of the above layer, separated for sampling purposes; structure, if any, becomes weaker with depth; pH 5.4.

C_1 44 to 57 inches, dark yellowish-brown (10YR 4/4), single-grain fine sand with few very dark grayish-brown to dark-gray (10YR 3/4), soft, concretionary lumps; lumps are fewer and softer than in B_{22} horizon; loose; pH 5.4; gradual boundary.

C_2 57 inches +, very dark grayish-brown to dark-gray (10YR 3/4) fine sand; pH 5.4.

Markland silt loam, S57WVa-18-6-(1-7).—Sampled in a field of alfalfa and ladino clover, ½ mile south of the intersection of W. Va. Highway 56 and U.S. Highway 21—200 yards east of the highway, Jackson County. Slope, 4 percent.

Soil profile:

A_p 0 to 7 inches, grayish-brown (10YR 5/2) silt loam when dry; dark grayish brown (10YR 4/2) when moist; weak, fine, granular structure; friable when moist; abrupt, smooth boundary.

A_2 7 to 11 inches, light olive-brown (2.5Y 5/4) silt loam; tendency to weak, thin, platy structure; slightly firm when moist; clear, wavy boundary.

B_1 11 to 15 inches, yellowish-brown (10YR 5/6) silty clay loam; moderate, fine and medium, subangular blocky structure; firm when moist; a few fine mottlings of light brownish gray (10YR 6/2) and strong brown (7.5YR 5/6) in the lower part of the horizon; abrupt, wavy boundary.

B_{21g} 15 to 21 inches, yellowish-brown (10YR 5/6) silty clay with distinct mottling of strong brown (7.5YR 5/6) and light brownish gray (10YR 6/2); moderate, coarse, subangular blocky breaking to strong, fine and medium, blocky structure; firm when moist; prominent clay coatings; some vertical cracking; gradual, wavy boundary.

B_{22g} 21 to 29 inches, yellowish-brown (10YR 5/6) silty clay with grayish-brown (10YR 5/2) clay coatings and common, distinct mottling of light brownish gray (10YR 6/2) and strong brown (7.5YR 5/6); medium, coarse, blocky breaking to moderate, medium, subangular blocky structure arranged in weak, thick plates; firm when moist; gradual, wavy boundary.

B_3 29 to 34 inches, yellowish-brown (10YR 5/4) silty clay coated with grayish brown (10YR 5/2); weak, thick and medium, platy structure; firm when moist; common manganese concretions and faces; gradual, wavy boundary.

C 34 inches +, olive-brown (2.5Y 4/4) silty clay; slightly firm; some weakly defined coarse polygons; common to many manganese concretions; some clay flows on faces; breaks to weak, thick and thin, platy structure.

Markland silt loam, S57WVa-27-7-(1-6).—Sampled in a meadow, 2 miles east of Mercers Bottom, 300 yards west of the bridge over Sixteen Mile Creek, Mason County. Slope, 3 percent.

Soil profile:

A_p 0 to 8 inches, pale-brown (10YR 6/3) silt loam when dry; grayish brown (10YR 5/2) when moist; weak, granular structure; slightly hard when dry, friable to slightly firm when moist; pH 7.3.

A_3 8 to 12 inches, reddish-brown (2.5Y 5/4) silty clay loam with light yellowish-brown (10YR 6/4) coats on peds; moderate, medium, subangular blocky structure; slightly firm when moist; occasional clay flows; pH 4.9.

B_1 12 to 16 inches, yellowish-brown (10YR 5/6) silty clay faintly mottled with strong brown (7.5YR 5/8) and grayish brown (10YR 5/2); moderate, coarse and medium, subangular blocky structure; firm when moist; prominent, continuous clay coats; pH 5.2.

B_{21g} 16 to 25 inches, yellowish-brown (10YR 5/6) silty clay, and brown (10YR 5/3) strongly mottled with strong brown (7.5Y 5/6) and grayish brown (10YR 5/2); weakly developed, very coarse prisms; firm when moist and plastic when wet; prominent clay flows on prisms; occasional discontinuous clay flows on faces within prisms; pH 5.4.

B_{22g} 25 to 33 inches, yellowish-brown (10YR 5/6) clay, and brown (10YR 5/3) strongly mottled with strong brown (7.5Y 5/6) and grayish brown (10YR 5/2); massive with weakly developed coarse prisms; clay flows on prism faces; firm when moist and plastic when wet; few calcium carbonate specks in lower part; few manganese concretions and coats; pH 6.2.

C_{ca} 33 to 50 inches +, olive-brown (2.5Y 4/4) clay weakly mottled as above horizon; massive with coarse, weak polygons coated with manganese and clay flows; firm when moist and somewhat plastic when wet; numerous calcium concretions and manganese coats and concretions; pH 7.6.

Monongahela silt loam, S57WVa-27-5-(1-7).—Sampled in a cultivated field, ½ mile south of Sand Hill Road, 3 miles east of Point Pleasant, Mason County. Slope, 5 percent.

Soil profile:

A_p 0 to 8 inches, dark-brown (10YR 4/3) silt loam; weak, fine, subangular blocky structure; very friable when moist; pH 6.9; abrupt, smooth boundary.

A_2 8 to 10½ inches, light olive-brown (2.5Y 5/6) silt loam, with very weak, thin, platy structure; friable when moist; some mixing with A_p horizon; many roots and coarse pores; pH 6.9; clear, wavy boundary.

B_2 10½ to 20 inches, yellowish-brown (10YR 5/6) silt loam; clay coatings and fine pores common; weak, medium subangular blocky structure; friable to somewhat firm; pH 4.6; clear, wavy boundary.

B_3 20 to 28 inches, silt loam that is splotched or mottled yellowish brown (10YR 5/8—5/4) with prominent clay skins of dark yellowish brown (10YR 4/4); moderate, thick, platy structure breaking to moderately thin, platy peds; clay skins are prominent on both thick and thin peds; firm when moist; manganese concretions and very small coats; pH 5.1; clear, wavy boundary.

B_{31gm} 28 to 41 inches, fragipan of fine silt loam strongly mottled with yellowish brown (10YR 5/8) and pale brown (10YR 6/3); strong, thick, platy structure breaking into medium, subangular blocky peds; peds are arranged as coarse prism polygons with very prominent clay flows of gray (10YR 5/1); hard when dry, firm to very firm when moist; pH 5.3; boundary is arbitrary for sampling purposes.

B_{32gm} 41 to 52 inches, similar to the B_{31gm} horizon but has increased clay and silty clay loam texture; common manganese coats and concretions throughout the fragipan horizon; pH 5.4.

D 52 to 60 inches +, heavy silty clay loam with base color of yellowish brown (10YR 5/8); brown (10YR 5/3) faces having many medium, distinct mottles of gray (10YR 6/1); clay skins are prominent; weak, coarse, subangular blocky structure breaking into moderate, medium, subangular blocky peds; some evidence of coarse polygons; pH 5.2.

Monongahela silt loam, S57WVa-18-4-(1-8).—Sampled in a cultivated field (meadow), 3 miles southeast of Ravenswood along the old Ravenswood-Ripley Pike, 2 miles east of W. Va. Route 2, Jackson County. Slope, 2 to 4 percent. The reddish-brown D_u horizon of this profile is not present under all Monongahela soils.

Soil profile:

A_p 0 to 8 inches, grayish-brown (10YR 5/2) silt loam when dry; dark grayish brown (10YR 4/2) to brown (10YR 5/3) when moist; weak, fine, granular structure; friable when moist; common, fine manganese concretions; pH 6.3; abrupt, smooth boundary.

A_2 8 to 13 inches, light olive-brown (2.5Y 5/6) silt loam when moist; weak, thin, platy structure; friable when moist; common fine pores; common fine manganese concretions; pH 5.8; clear, wavy boundary.

A_3 13 to 18 inches, yellowish-brown (10YR 5/6) silt loam; light olive-brown (2.5Y 5/4) silt flows; weak, medium, subangular blocky structure; friable when moist; common fine pores; pH 5.1; clear, wavy, boundary.

B_1 18 to 22 inches, yellowish-brown (10YR 5/6) silt loam with common distinct mottling of very pale brown (10YR 7/4) and brown to dark-brown (7.5YR 4/4) silt loam; weak, thin, platy and moderate, medium subangular blocky structure; friable to slightly firm when moist; few manganese faces; common coarse pores; thin, patchy, discontinuous clay skins that appear to be degraded and eroded; pH 5.0; clear, wavy boundary.

B_{21gm} 22 to 32 inches, fragipan of silty clay loam strongly mottled and splotched with light brownish gray (10YR 6/2), yellowish brown (10YR 5/8), and brown to dark brown (7.5YR 4/2); coarse polygons breaking into moderate, thick and medium, platy structure; prominent clay flows (10YR 5/2), ⅛ to ¼ inch thick, on polygon faces and continuous clay coats and some manganese coatings on faces of plates; firm when moist; common, fine manganese concretions and common, medium pores; pH 5.3; gradual, wavy boundary.

B_{22gm} 32 to 40 inches, silty clay loam strongly mottled and splotched with light brownish gray (10YR 6/2), yellowish brown (10YR 5/8), and brown to dark brown (7.5YR 4/2); coarse, well-defined polygons breaking into strong, thick, platy structure; ¼-inch clay flow on polygon faces; manganese coatings common to many and more strongly defined than in above horizon; very firm when moist; pH 5.2; gradual, wavy boundary.

B_3 40 to 48 inches, yellowish-brown (10YR 5/6) silty clay loam coated with brown (10YR 5/3); weak, medium, subangular blocky structure; firm when moist and somewhat plastic when wet; clay skins common, discontinuous, and somewhat patchy; pH 5.8; clear boundary.

D_u 48 to 108 inches +, reddish-brown (2.5YR 4/4), very smooth, highly plastic but not sticky clay with brown to dark-brown (7.5YR 4/4) varves, 1/16 to ⅛ inch thick; massive; hard when dry, firm when moist, and plastic when wet; pH 7.1; material in this horizon apparently laid down by slow-moving water and is possibly an old lake deposit.

Muskingum sandy loam, S57WVa-27-8-(1-7).—Sampled in woods, in an area of Muskingum-Upshur soils, 1 mile east of Point Pleasant, 300 feet north of the Sand Hill-Letart Road, Mason County. Vegetation is second-growth trees of sassafras, red oak, chestnut oak, and yellow-poplar. Slope, 40 percent.

Soil profile:

A_{00} One-half inch of leaf litter.

A_0 One inch of decomposed leaf litter; coarse, granular structure.

A_1 0 to 3 inches, dark grayish-brown (10YR 4/2) sandy loam; moderate, medium, granular and medium, subangular blocky structure; very friable when moist; pH 5.4; clear, wavy boundary.

A_2 3 to 4½ inches, brown (10YR 5/3) sandy loam; weak, medium, platy and weak, fine, subangular blocky structure; friable when moist; pH 5.0; clear, wavy boundary.

A_3 4½ to 6 inches, yellowish-brown (10YR 5/4), moderately sandy loam; moderate, medium, platy structure; platiness quite pronounced; friable when moist; pH 5.4.

B_1 6 to 12 inches, yellowish-brown (10YR 5/6) sandy loam; weak, medium, platy and weak, subangular blocky structure; platiness much less pronounced than in A_3 horizon; friable when moist; pH 5.4.

B_{21} 12 to 19 inches, yellowish-brown (10YR 5/8) sandy clay loam; weak, medium and coarse, subangular blocky structure; friable when moist; common, discontinuous clay coatings; pH 5.0.

B_{22} 19 to 26 inches, strong-brown (7.5YR 5/8) sandy clay loam; moderate, medium and coarse, subangular blocky structure; friable when moist; prominent but discontinuous clay coats; few small manganese coatings and concretions; pH 5.0.

C 26 to 30 inches, strong-brown (7.5YR 5/6) sandy loam; structureless; very friable when moist; rotten, highly micaceous sandstone fragments common; pH 5.2.

D_r 30 inches +, weathered, micaceous sandstone.

Muskingum silt loam, S57WVA-3-1-(1-6).—Sampled in woods along Chapmansville-Turtle Creek Road, 5 miles south of Turtle Creek, 100 yards west of road at a low gap, Boone County, W. Va. Trees are ash, white oak, elm, hickory, yellow-poplar, basswood, and dogwood. Slope, 40 percent; aspect, east; sampled in the middle third of the slope. Surface soil contains about 10 percent small angular stones; stones are larger and more numerous with increasing depth. Orientation of the stones and the irregular soil horizons indicate that the soil has been mixed somewhat by downhill creep.

Soil profile:

A_0 1 to 0 inch, thin layers of leaves and partly decomposed twigs and leaves. (Not sampled.)

A_1 0 to 4 inches, very dark grayish-brown to dark-gray (10YR 3/3) loam; weak, fine, granular structure; friable when moist; 5 to 10 percent small, angular stone fragments; pH 6.7; clear, wavy boundary.

A_2 4 to 6 inches, brown (10YR 5/3) loam; weak, thin, platy and weak, granular structure; friable when moist; pH 6.6; clear, wavy boundary.

B_1 6 to 10 inches, yellowish-brown (10YR 5/6) loam coated with brown (10YR 5/3); weak, fine, subangular blocky structure; slightly firm when moist; faint, discontinuous clay coats; pH 5.7; clear, wavy boundary.

B_2 10 to 20 inches, strong-brown (7.5YR 5/6) sandy clay loam coated with yellowish brown (10YR 5/4); moderate, medium, subangular blocky structure; firm when moist and slightly plastic when wet; prominent clay pockets and coats, not continuous; 20 percent angular stone fragments; pH 6.1; clear, irregular boundary.

B_3 20 to 26 inches, strong-brown (7.5YR 5/6) silty clay loam with occasional weak clay coats; weak, coarse, subangular blocky structure tending to massive; firm when moist and slightly plastic when wet; 30 percent stone fragments; pH 6.2; gradual, irregular boundary.

C 26 to 30 inches, yellowish-brown (10YR 5/6) and strong-brown (7.5YR 5/6) sandy clay loam mixed because of parent material; massive; firm when moist and slightly plastic when wet; 30 to 50 percent stone fragments; pH 6.0; gradual, irregular boundary.

D_r 30 inches +, sandstone C material in cracks.

Muskingum silt loam, S57WVa-18-8-(1-5).—Sampled in woods of second-growth hardwood trees, formerly a cultivated field, 3.2 miles east of Kenna on Fisher Ridge Road, Jackson County. The sample was taken near the ridgetop; the profile is somewhat thinner than in much of the Muskingum soils but is fairly typical of the eroded Muskingum soils in this area. Slope, 30 percent; aspect, north. The surface is nonstony, but there are stone fragments that increase with depth.

Soil profile:

A_p 0 to 3 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; friable when moist; pH 5.8; abrupt, wavy boundary.

A_2 2 to 3½ inches, yellowish-brown (10YR 5/4) silt loam; weak, fine, subangular blocky structure; firm when moist; discontinuous—most of A_2 is mixed with A_p; pH 5.7.

B_2 3 to 8 inches, yellowish-brown (10YR 5/6), heavy silt loam coated with yellowish brown (10YR 5/4); weak to moderate, medium and coarse, subangular blocky structure; firm when moist; clay coats distinct but discontinuous; 2 percent soft sandstone fragments; pH 4.8; clear, wavy boundary.

B_3 8 to 11 inches, yellowish-brown (10YR 5/8) sandy loam coated with brown (10YR 5/3); weak, medium, subangular blocky structure; friable when moist; occasional clay coats; pH 4.9.

C 11 to 24 inches, yellowish-brown (10YR 5/8) sandy loam; massive; friable when moist; 10 to 15 percent small, soft sandstone fragments; pH 4.9.

D_r 24 inches, coarse-grained, soft, micaceous sandstone.

Upshur clay loam, S57WVa-18-2-(1-7).—Sampled in a field of Virginia pines that were about 20 years old, 2 miles east of Mount Alto and 1 mile south of Route 33, along a gasline 200 feet east of the gravel road, Jackson County. Slope, 5 percent; aspect, west. The original A_1 and A_2 horizons, if they were present, have been removed by erosion. The present A_p horizon probably is part of the original B_2 horizon.

Soil profile:

A_{p1} 0 to 3 inches, under ¼ to ½ inch of dead grass and leaves, dark reddish-brown (5YR 3/2) silty clay loam; strong, coarse, granular structure; slightly hard when dry and firm when moist; the upper ½ to ¾ inch of this layer has fine, granular structure, is hard when dry, and appears to be worm or insect casts; many grass roots stained with organic matter; tree roots ¼ inch in diameter run parallel to lower boundary of horizon; pH 5.2; clear, smooth boundary.

A_{p2} 3 to 7 inches, dark reddish-brown (2.5YR 3/4) clay coated with weak red to reddish brown (2.5YR 4/3); strong, coarse, blocky and subangular blocky structure; firm when moist and sticky and plastic when wet; clay film distinct and continuous; pH 5.0; smooth boundary.

B_{21} 7 to 17 inches, reddish-brown to red (2.5YR 4/5) clay coated with weak red to reddish brown (2.5YR 4/3); strong, coarse and medium, blocky and subangular blocky structure; firm when moist and sticky and plastic when wet; clay films distinct and complete; pH 4.7; gradual boundary.

B_{22} 17 to 23 inches, reddish-brown to red (2.5YR 4/5) clay coated with reddish brown (2.5YR 4/4); moderate, medium, blocky and subangular blocky structure; firm when moist and sticky and plastic when wet; clay films less distinct than on B_{21} horizon; pH 4.6; gradual boundary.

B_3 23 to 36 inches, reddish-brown (2.5YR 4/4) clay coated with weak red to reddish brown (2.5YR 4/3); weak, medium and fine, subangular blocky structure; firm when moist and sticky and plastic when wet; clay films distinct on faces and in pockets in interiors; pH 5.1; gradual boundary.

C_1 36 to 47 inches, weak-red to dusky-red (10R 4/2–3/2) clay with few, fine mottles of pale brown to grayish brown (10YR 6/3–5/2) and weak red (10R 4/4); massive cleavage planes from weathered shale give appearance of weak, platy structure; firm when moist and slightly sticky and plastic when wet; contains few calcareous concretions; pH 7.0; arbitrary boundary.

C_2 47 to 60 inches +, dusky-red (10R 3/2) silty clay with bands having many fine mottles of light olive brown (2.5Y 5/4–5/6), dark grayish brown (2.5Y 4/2), and reddish gray (10R 5/1); massive cleavage planes from weathered shale give appearance of weak, platy structure; firm when moist and slightly sticky and plastic when wet; common, very soft shale fragments and calcareous concentrations; pH 7.1.

Tree roots occur throughout the profile to 54 inches or more, but they diminish with depth.

Upshur clay loam, S57WVa-18-5-(1-6).—Sampled in an old field that now has a stand of Virginia pine trees, 10 to 12 years old. Sample was taken 2½ miles south of Mount Alto roadside park, Jackson County. Slope, 4 percent. The soil has been severely eroded, and the present A_p horizon consists of soil that originally was part of the B_2 horizon.

Soil profile:

A_p 0 to 7 inches, dark reddish-brown (5YR 3/3) clay loam; moderate, fine, granular structure; firm when moist and slightly sticky when wet; pH 4.7; abrupt, smooth boundary.

B_{21} 7 to 13 inches, reddish-brown (2.5YR 4/4) clay coated with reddish brown (5YR 4/3); strong, fine and medium, blocky structure; firm when moist and plastic and sticky when wet; prominent and continuous clay coats; pH 4.8; clear boundary.

B_{22} 13 to 20 inches, weak-red (10R 4/4) clay coated with reddish brown (2.5YR 4/4); strong, medium, blocky structure; plastic and sticky when wet; prominent, continuous clay coats; pH 4.8; smooth, gradual boundary.

B_{23} 20 to 30 inches, reddish-brown (2.5YR 4/4) clay coated with weak red (2.5YR 4/3); moderate, fine and medium, blocky structure; very plastic and sticky when wet; occasional prominent horizontal slickensides; weak and discontinuous clay coats; pH 4.8.

B_3 30 to 40 inches, reddish-brown (5YR 4/3) clay coated with weak red (2.5YR 4/2); weak, fine, blocky structure tending to massive; very plastic and sticky when wet; occasional discontinuous clay coats; common manganese coatings; occasional slickensides; pH 5.8.

C 40 to 67 inches, reddish-brown (5YR 4/3) clay coated with weak red (10R 4/2), decomposed shale flakes; massive; slightly plastic and sticky when wet; many manganese concretions; occasional lime specks increasing with depth; pH 6.1.

D 67 inches +, red alkaline and weakly calcareous clay shale. (Not sampled.)

Vandalia silty clay loam, S57WVa-18-1(1-8).—Sampled in second-growth woods of red oak, black oak, white oak, some hickory, dogwood, and maple; 2 miles east of Mount Alto, along Route 33 at the roadside park, 150 feet south of the pond, Jackson County. Slope, 20 percent; colluvial position. This is a virgin area, but it probably has been pastured, and some soil has been removed by erosion.

Soil profile:

A_1 0 to 3 inches, very dark grayish-brown (10YR 3/2) silty clay loam; top half is very dark gray (10YR 3/1) because of higher content of organic matter; moderately fine and medium, subangular blocky and fine, granular structure; friable when moist; contains 5 percent gravel; pH 5.3; clear, irregular boundary.

A_2 3 to 6 inches, brown (7.5YR 5/4) silty clay loam; top inch is brown to dark brown (10YR 4/3) stained with organic matter; moderate, medium, subangular blocky structure tending to platy; slightly firm when moist and slightly plastic when wet; contains 5 percent gravel; pH 5.2; clear, wavy boundary.

B_{21} 6 to 13 inches, reddish-brown (5YR 4/4) clay coated with reddish brown (5YR 4/3); strong, medium, blocky and subangular blocky structure; crushes to fine, subangular blocky structure; slightly firm when moist and plastic and slightly sticky when wet; peds have distinct, complete clay coating; contains 5 to 10 percent gravel; pH 4.8; gradual boundary.

B_{22} 13 to 24 inches, reddish-brown (5YR 4/4) clay coated with reddish brown (5YR 5/3) with many fine specks or mottles of reddish brown (2.5YR 4/4); moderate, medium, subangular blocky structure that crushes easily to fine, subangular blocky structure; slightly firm when moist, plastic and slightly sticky when wet; ped coats distinct and complete; contains 15 percent gravel that is subrounded, soft, weathered sandstone; gradual boundary.

B_3 24 to 33 inches, reddish-brown (5YR 5/4) clay with light reddish-brown (5YR 6/3) and reddish-gray (5YR 5/2) coatings and a few black manganese coatings; moderate, coarse, subangular blocky structure that crushes to fine and medium, subangular blocky structure; firm when moist and plastic and slightly sticky when wet; coatings distinct and complete; contains 25 percent gravel; pH 4.9; gradual boundary.

C_1 33 to 42 inches, reddish-brown to brown (6YR 5/4) silty clay with coatings of light reddish brown (5YR 6/3), reddish brown (5YR 5/3), and some dark brown to brown (7.5YR 4/4); gray coatings appear somewhat silty and are more extensive and prominent than in B_3; many manganese coatings; moderate, medium and thick, platy and blocky structure; firm when moist and plastic and slightly sticky when wet; clay film distinct and continuous; 30 percent gravel and stone; pH 5.1; arbitrary boundary.

C_2 42 to 55 inches, same as C_1 except that the boundary is gradual; 30 percent gravel and stones; pH 5.5.

D_u 55 inches +, reddish-brown (2.5YR 4/4) clay; moderately fine and medium, blocky structure; slightly firm when moist, plastic and sticky when wet; appears to be Upshur soil material; contains 20 percent gravel; pH 5.5.

Gravel fragments in the profile are weathered, olive-gray, soft sandstone. Some have black manganese coatings. Manganese coatings have penetrated to the center of the sandstone, so that broken pieces are black or dark reddish brown. The subangular blocky shape of the gravel fragments was probably caused by colluvial movement. Many fine roots are in the A_1 horizon and extend into the C_2 and D horizons.

Vandalia silty clay loam, S57WVa-18-7-(1-6).—Sampled in a bluegrass pasture, ½ mile south of the junction of U.S. Route 21 and W. Va. Route 56, and ¼ mile west of Route 21, Jackson County. Slope, 15 percent; colluvial position. Small angular gravel and flagstones make up about 10 to 15 percent of the soil mass. Erosion has been moderate, and there are numerous healed slips. The A_p horizon consists of soil that was formerly part of the B_2 horizon. The original A horizon has been nearly all removed by erosion.

Soil profile:

A_p 0 to 5 inches, reddish-brown (5YR 4/3) silty clay loam; strong, fine, subangular blocky structure; pH 5.2; abrupt boundary.

B_{21} 5 to 16 inches, dark reddish-brown (2.5YR 3/4) silty clay coated with reddish brown (2.5YR 4/4); strong, fine and medium, blocky structure; firm when moist and slightly plastic when wet; prominent, continuous clay coats; pH 4.8; clear boundary.

B_{22} 16 to 22 inches, dark reddish-brown (2.5YR 3/4) clay coated with weak red (2.5YR 4/2); few fine manganese concretions and coats; moderate, fine and medium, subangular blocky structure; plastic when wet; 20 percent channery-shaped gravel and flagstones; prominent, continuous clay coats; pH 4.7; clear, wavy boundary.

B_3 22 to 28 inches, dark reddish-brown (2.5YR 3/4) clay; weak, fine, subangular blocky structure; plastic and slightly sticky when wet; weak, discontinuous clay coats; pH 5.7; clear, wavy boundary.

C_1 28 to 37 inches, dark reddish-brown (5YR 3/3) clay; weak, fine, subangular blocky structure tending to massive; very plastic and slightly sticky when wet; occasional clay coats; numerous manganese concretions; pH 6.2; gradual boundary.

C_2 37 to 50 inches +, dark reddish-brown (2.5YR 3/4) clay; massive; very plastic and slightly sticky when wet; many fine manganese concretions; pH 6.6; gradual boundary.

Wheeling silt loam, S57WVa-27-3-(1-5).—Sampled in a cultivated field, 8 miles north of Point Pleasant and ¾ mile west of the sign marking Clifton McClintock Wildlife Refuge along W. Va. Route 62, Mason County. Slope, 1 percent. The solum is slightly thinner and texture of the horizon is slightly coarser than in a typical Wheeling silt loam, but it is representative of much of the Wheeling silt loam in this area.

Soil profile:

A_p 0 to 11 inches, dark-brown (10YR 3/3) very fine sandy loam with very weak, fine, subangular blocky structure; very friable when moist; pH 6.7; boundary abrupt and wavy.

B_1 11 to 17 inches, dark yellowish-brown (10YR 4/4) coarse silt loam with faces of dark brown (10YR 3/3); weak, medium and fine, subangular blocky structure; friable; contains few, small manganese concretions; pH 5.4; clear, wavy boundary.

B_2 17 to 28 inches, yellowish-brown (10YR 5/6) loam with dark-brown (10YR 4/3) ped faces; moderate, medium, subangular blocky structure; friable to firm when moist; contains few, small manganese concretions; clay coats distinct but discontinuous; gradual, wavy, boundary.

B_{22} 28 to 36 inches, yellowish-brown loam with ped coatings of dark yellowish brown (10YR 3/4); moderate, medium, subangular blocky structure; friable when moist; clay coats on peds are distinct but not quite continuous; pH 4.9; abrupt, wavy boundary.

D_1 36 to 72 inches, yellowish-brown (10YR 5/4), structureless loamy fine sand containing occasional lumps, ½ to 1 inch in diameter, of slightly finer dark brown (7.5YR 4/4) loamy fine sand.

D_2 72 to 132 inches +, fine sand. (Not sampled.)

Wheeling silt loam, S57WVa-27-4-(1-7).—Sampled in an idle, formerly cultivated field in the wildlife refuge, Mason County, ½ mile north of the headquarters of the Conservation Commission of West Virginia. Slope, 2 percent.

Soil profile:

A_p 0 to 9 inches, dark grayish-brown (10YR 4/2) loam with weak, fine, granular structure; friable when moist; pH 6.4; abrupt, smooth boundary.

A_2 9 to 12 inches yellowish-brown (10YR 5/4) silt loam with very weak, medium, subangular blocky structure; friable when moist; pH 6.9; abrupt, wavy boundary.

B_1 12 to 16 inches, dark yellowish-brown (10YR 4/4) silt loam with weak, medium, subangular blocky structure; friable when moist; pH 6.7; clear, wavy boundary.

B_2 16 to 23 inches, yellowish-brown (10YR 5/6) silt loam with occasional specks of manganese; moderate, medium, subangular blocky structure; peds distinctly coated with clay film; slightly firm when moist; pH 5.8; clear, wavy boundary.

B_3 23 to 38 inches, yellowish-brown (10YR 5/6) silt loam with ped faces of dark yellowish brown (10YR 4/4); weak, fine and medium, subangular blocky structure; friable when moist; contains numerous manganese coatings and concretions; occasional clay coats and pockets; pH 5.0; clear, wavy boundary.

D_1 38 to 49 inches, dark-brown (7.5YR 4/4) sandy clay loam with weak, coarse, subangular blocky structure; common, but discontinuous, clay coatings; friable when moist; pH 5.0; gradual boundary.

D_2 49 to 72 inches, dark-brown (7.5YR 4/4) sandy loam; structureless; very friable; pH 5.0.

D_3 72 inches +, dark-brown (7.5YR 4/4) loamy sand; structureless. (Not sampled.)

Glossary

The definitions in this glossary were taken from the 1957 Yearbook of Agriculture (*11*).

Aeration, soil. The process by which air and other gases in the soil are renewed. The rate of soil aeration depends largely on the size and number of pores in the soil and on the amount of water clogging the pores.

Aggregate, soil. A single mass or cluster consisting of many primary soil particles held together, such as a clod, crumb, block, or prism.

Alluvial soil. Soil formed from material, such as gravel, sand, silt, or clay, deposited by a stream of water and showing little or no modification of the original materials by soil-forming processes.

Association, soil. Soils that occur together in a characteristic pattern make up a soil association. An association consists of a few or of many soils. The soils may be similar or may be of many different types. Although closely associated geographically, the soils in an association may differ in their suitability for agricultural use.

Azonal soils. Any group of soils that lack well-developed profile characteristics because of their youth, or because relief or the kind of parent material has prevented the normal soil profile from developing.

Base saturation. The relative degree to which a soil has absorbed metallic cations (calcium, potassium, magnesium, etc.). The proportion of the cation-exchange capacity that is saturated with metallic cations.

Bedrock. The solid rock that underlies the soils and other unconsolidated material or that is exposed at the surface.

Calcareous. Containing calcium carbonate or lime.

Catena, soil. A group of soils, within a specific soil zone, developed from similar parent material but differing in profile characteristics because of differences in relief or drainage.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter (0.000079 inch) in diameter. As a soil textural class, soil material that contains 40 percent or more of clay, less than 45 percent of sand, and less than 40 percent of silt.

Claypan. A compact, slowly permeable soil horizon rich in clay and separated more or less abruptly from the overlying horizon.

Coarse textured and moderately coarse textured soils. Sand, loamy sand, sandy loam, and fine sandy loam.

Colluvial soils. Soils formed from material that has been moved downhill by gravity, soil creep, frost action, or local erosion. The material accumulates on lower slopes and at the foot of slopes.

Complex, soil. An intricate mixture of small areas of different kinds of soil. The soils cannot be indicated separately on maps of the scale used and are therefore mapped as a unit.

Consistence. The combination of properties of soil material that determines its resistance to crushing and its ability to be molded or changed in shape. Terms commonly used to describe consistence are as follows:

Loose. Noncoherent; will not hold together in a mass.

Friable. When moist, crushes easily under 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.

Hard. When dry, moderately resistant to pressure; can barely be broken between thumb and forefinger.

Cemented. Hard and brittle; little affected by moistening.

Coniferous trees. Trees that bear cones like the pines; usually have needles which persist over winter.

Consolidated rock. Rock made solid by the effect of pressure, chemical action, or crystallization, from a previous fluid or loosely aggregated condition.

Contour farming. Conducting field operations such as plowing, planting, cultivating, and harvesting in rows that are at right angles to the natural direction of the slope and as nearly level as practical.

Cover crops. Close-growing crops, grown primarily to improve the soil and protect it between periods of regular crop production; or grown between trees in orchards.

Deciduous trees. Trees that drop their leaves annually.

Diversion terrace. A channel with a supporting ridge on the lower side, constructed across the slope to intercept runoff and carry it to a planned outlet. These terraces are maintained in permanent sod.

Drainage terrace. A relatively deep channel and low ridge constructed across the slope primarily for drainage.

Erodible. Subject to erosion; soil easily lost through the action of water or wind.

Erosion. The wearing away of the surface of the soil by running water, wind, or other geological agencies.

Family, soil. A category in soil classification between series and great soil group; a taxonomic group of soils having similar profiles, composed of one or more distinct soil series (8).

First bottoms. The normal flood plain of a stream, part of which may be flooded only infrequently.

Flood plain. The nearly level areas that occur along streams and are subject to flooding.

Fragipan. Compact horizons, rich in silt, sand, or both, and generally relatively low in clay. They occur in many gently sloping or nearly level soils in humid, warm-temperate climates. The fragipan commonly interferes with root penetration. When dry, the compact material appears to be indurated, but the apparent induration disappears when the soil is moistened. Fragipans occur in soils developed either from residual or from transported parent materials.

Geological erosion. Normal erosion that takes place when soil is under native vegetation and is undisturbed by human activity.

Glacial outwash. (See Outwash, glacial.)

Great soil group (soil classification). Any one of several broad groups of soils with fundamental characteristics in common. Examples are Gray-Brown Podzolic, Red-Yellow Podzolic, and Planosol groups.

Gleization. The process of soil formation leading to the development, under the influence of excessive moisture, of a gley horizon in the lower part of the solum. A soil horizon in which the material ordinarily is bluish gray or olive gray, more or less sticky, compact, and in many places structureless, is called a gley horizon and has developed under the influence of excessive moistening.

Grassed waterway. A waterway planted to grass to protect it against erosion; sometimes graded or shaped to control runoff.

Green-manure crop. A crop of grasses or legumes worked into the soil while green or soon after maturity to improve the soil.

Gully. A steep-sided channel resulting from accelerated erosion; large enough to be an obstacle to farm machinery.

Hardpan. A horizon or soil layer that is strongly compacted or cemented.

Horizon, soil. A layer of soil, approximately parallel to the soil surface, with distinct characteristics produced by soil-forming processes. Horizons are identified by letters of the alphabet.

A horizon. The horizon at the surface. It contains organic matter, or it has been leached of soluble minerals and clay, or it shows the effects of both. The major A horizon may be subdivided into A_1, the part that is darkest in color because it contains organic matter, and A_2, the layer that is the most leached and has the lightest color in the profile. In woodlands a layer of organic matter accumulates on the mineral soil; this layer is called the A_0 horizon. The depth of the soil, however, is measured from the top of the mineral soil, because the A_0 horizon is rapidly destroyed if fires occur or if the soil is cultivated. Upper layers of the soil that are thoroughly mixed by cultivation are called the A_p horizon.

B horizon. The horizon in which clay, minerals, or other material has accumulated, or which has developed a characteristic blocky or prismatic structure, or which shows the characteristics of both processes. It may be subdivided into B_1, B_2, or B_3 horizons. The B_2 horizon may be subdivided further by adding a number to the symbol, such as B_{21}, B_{22}, or B_{23}.

C horizon. The unconsolidated material immediately under the true soil. It is presumed to be similar in chemical, physical, and mineral composition to the material from which at least part of the overlying solum has developed.

D layer. 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 C horizon has developed or like that from which the parent material of the solum has developed if no C horizon is present, it is designated as D_r.

Gleyed horizon. A strongly mottled or gray horizon that occurs in soils of restricted drainage. It is designated by the subscript $_g$.

Igneous rock. A rock produced through the cooling of melted mineral materials.

Inclusions. Areas of soil mapped with a soil of a different type because they were too small to be mapped separately on a map of the scale used.

Intrazonal soil. Any of the great groups of soils that have more or less well-developed soil characteristics that reflect the dominating influence of some local factor of relief, parent material, or age over the normal effect of climate and vegetation.

Lacustrine. Deposited by lake water. Lakes that deposited the material may or may not be in existence now.

Leached layer. A layer from which the soluble constituents have been washed away by percolating water.

Mapping unit, soil. An area of soil enclosed by a boundary and identified by a symbol on the soil map.

Massive. Large uniform masses of cohesive soil, sometimes with ill-defined and irregular cleavage, as in some of the fine-textured alluvial soils; structureless.

Medium-textured soil. Very fine sandy loam, loam, silt loam, and silt.

Micaceous. Containing mica.

Miscellaneous land type. Areas that have little true soil. These areas are not classified by series and types but are identified by a descriptive name, such as Sloping land, alluvial materials (So).

Moderately fine and fine textured soils. Clay loam, sandy clay loam, silty clay loam, sandy clay, silty clay, and clay.

Moisture-holding capacity. The ability of a soil to hold moisture that will not drain away but can be taken up by plant roots.

Mottling, soil. Contrasting color patches that vary in number and size. Descriptive terms are as follows: Contrast—faint, distinct, and prominent; abundance—few, common, and many; and size—fine, medium, and coarse. The size measurements are the following: Fine, less than 5 mm. (about 0.2 in.) in diameter along the greatest dimension; medium, ranging from 5 to 15 mm. (about 0.2 to 0.6 in.) in diameter along the greatest dimension; and coarse, greater than 15 mm. in diameter along the greatest dimension.

Munsell color notation. A method of designating soil color by a combination of letters and numbers, such as 5YR 3/4 (dark reddish brown). Use of the Munsell color notation is explained in the Soil Survey Manual *(10)*.

Outwash, glacial. A broad term that includes all of the material sorted and deposited beyond the glacial ice front by streams of melt water. Commonly this outwash occurs as plains, valley trains, or deltas in old glacial lakes. The valley trains of outwash may extend far beyond the farthest advance of the ice.

Parent material. The rock and unconsolidated fragments from which the soil developed.

Pedology. The science that treats of soil; soil science.

Peds. The soil aggregates; the natural structural pieces into which the soil tends to separate when disturbed.

Permeability. That quality of the soil that enables it to transmit water or air. Terms used to describe permeability are: Very slow, slow, moderately slow, moderate, moderately rapid, rapid, and very rapid.

Phase, soil. A subdivision of a soil type, other than one based on kind, thickness, and arrangement of layers. Steepness or character of slope, number of rock outcrops, degree of erosion, depth of soil over the substratum, and natural drainage are all examples of characteristics that suggest dividing a soil type into phases.

Physiographic province. One of the major geographic divisions of the continent.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Quartz. Crystallized silicon dioxide, commonly colorless, or transparent, although some varieties have color. Ordinary sand is mostly quartz.

Reaction, soil. The degree of acidity or alkalinity of the soil expressed in pH values and in words as follows *(10)*:

	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		

Residual soil. Soil formed from material weathered from the underlying consolidated rock.

Rill. A steep-sided channel resulting from accelerated erosion; usually only a few inches in depth and width; not large enough to be an obstacle to farm machinery.

Runoff. Rainwater that flows over the surface of the soil without sinking in; or the total volume of surface flow during a specified time.

Sand. Individual rock or mineral fragments in soils having diameters ranging from 0.05 mm. (0.002 inch) to 2.0 mm. (0.079 inch). Usually sand grains consist chiefly of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more of sand and not more than 10 percent of clay.

Sedimentary rock. A rock composed of particles deposited from suspension in water. Although there are many intermediate types, the principal groups of sedimentary rocks are (1) conglomerate (from sand and gravel), (2) sandstone (from sand), (3) shale (from clay), and (4) limestone (from calcium carbonate deposits).

Series, soil. A group of soils that have horizons similar, except for the texture of the surface soil, in their differentiating characteristics and arrangement in the soil profile, and developed from a particular type of parent material. A series may include two or more soil types that differ from one another in the texture of the surface soil.

Shale. A sedimentary rock formed by hardening of clay deposits into rock.

Sheet erosion. Gradual and uniform removal of soil material from the surface of the soil, without the formation of rills and gullies.

Silt. (1) Individual mineral particles of soil that range in diameter between the upper size of clay, 0.002 mm. (0.000079 inch), and the lower size of very fine sand, 0.05 mm. (0.002 inch). (2) Soil of the textural class silt contains 80 percent or more of silt and less than 12 percent of clay. (3) Sediments deposited from water in which the individual grains are approximately of the size of silt, although the term is sometimes applied loosely to sediments containing considerable sand and clay.

Soil. The natural medium for the growth of land plants on the surface of the earth; composed of organic and mineral materials.

Solum. The upper part of the soil profile, above the parent material; the part of the profile that has been noticeably affected by the soil-forming processes. The solum of well developed soils 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 the primary soil particles into lumps, granules, or other aggregates. Structure is described by grade (the distinctness and durability of the aggregates)—weak, moderate, or strong; by the size of the aggregates—very fine, fine, thin, very thin, medium, coarse, very coarse, thick, or very thick; and by their shape—platy, prismatic, columnar, blocky, subangular blocky, 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). The terms for shape are defined as follows:

Blocky. Aggregates are shaped like blocks; they may have flat or rounded surfaces that join at sharp angles.

Blocky, subangular. Aggregates have some rounded and some flat surfaces; upper sides are rounded.

Columnar. Aggregates are prismatic and rounded at the top.

Granular. Aggregates are roughly sperical, firm, and small and are either hard or soft but are generally firmer and less porous than aggregates having crumb structure and without the distinct faces of those having blocky structure.

Platy. Aggregates are flaky or platelike.

Prismatic. Aggregates have flat vertical surfaces, and their height is greater than their width.

Subsoil. The soil layers below the plow layer in soils with weak profile development; the B horizon of soils with distinct profiles.

Substratum. Any layer beneath the solum or true soil. It is applied both to parent material and to other layers unlike the parent material, below the B horizon or the subsoil.

Surface soil. The plow layer, or its equivalent in uncultivated soil.

Texture, soil. The relative amounts of particles of different size groups, called sand, silt, and clay, determine texture. A very common soil texture in Jackson and Mason Counties is silt loam. The silt loam is one-half or more silt and up to one-half sand; it contains very little clay.

Tilth, soil. The physical properties of the soil that affect the ease of cultivating it or its suitability for crops; implies the presence or absence of favorable soil structure.

Topsoil (engineering term). Soil material containing organic matter and suitable as a surfacing for shoulders and slopes.

Type, soil. A subgroup or category under the soil series based on the texture of the surface soil. A soil type is a group of soils having horizons similar in differentiating characteristics and arrangement in the soil profile and developed from a particular type of parent material. The name of the soil type consists of the name of the soil series plus the textural class name of the upper part of the soil equivalent to the surface soil. Thus Ashton silt loam is the name of a soil type within the Ashton series.

Varves. Distinctly marked annual deposits of sediment, regardless of origin; usually consist of two but may consist of more than two layers.

Water table. The upper surface of the ground water.

Zonal soil. Any one of the great groups of soils having well-developed soil characteristics reflecting the influence of the active factors of soil genesis—climate and living organisms, chiefly vegetation.

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GUIDE TO MAPPING UNITS AND CAPABILITY UNITS

Map symbol	*Mapping unit*	*Page*	*Capability unit*	*Page*
AfA	Ashton fine sandy loam, 0 to 3 percent slopes	53	IIs-6	13
AfB	Ashton fine sandy loam, 3 to 8 percent slopes	53	IIs-6	13
AsA	Ashton silt loam, 0 to 3 percent slopes	53	I-6	8
AsB	Ashton silt loam, 3 to 8 percent slopes	53	IIe-6	9
AsC	Ashton silt loam, 8 to 15 percent slopes	53	IIIe-6	14
BcC3	Brooke clay loam, 6 to 12 percent slopes, severely eroded	53	IVe-1	19
BcD3	Brooke clay loam, 12 to 25 percent slopes, severely eroded	53	VIe-1	22
ChA	Chilo sandy loam, 0 to 3 percent slopes	54	IIIw-1	17
DuB	Duncannon silt loam, 3 to 8 percent slopes	54	IIe-4	9
DuC	Duncannon silt loam, 8 to 15 percent slopes	54	IIIe-4	13
DuC3	Duncannon silt loam, 8 to 15 percent slopes, severely eroded	54	IVe-3	19
DuD	Duncannon silt loam, 15 to 25 percent slopes	54	IVe-3	19
DuD3	Duncannon silt loam, 15 to 25 percent slopes, severely eroded	54	VIe-2	22
DuE	Duncannon silt loam, 25 to 40 percent slopes	54	VIIe-2	24
DuE3	Duncannon silt loam, 25 to 40 percent slopes, severely eroded	54	VIIe-2	24
GsA	Ginat silt loam, 0 to 3 percent slopes	55	IIIw-1	17
HaA	Hackers silt loam, 0 to 3 percent slopes	55	I-6	8
HaB	Hackers silt loam, 3 to 8 percent slopes	55	IIe-6	9
HoC	Holston silt loam, 8 to 15 percent slopes	56	IIIe-4	13
HoC3	Holston silt loam, 8 to 15 percent slopes, severely eroded	56	IVe-3	19
HoD	Holston silt loam, 15 to 25 percent slopes	56	IVe-3	19
HoD3	Holston silt loam, 15 to 25 percent slopes, severely eroded	56	VIe-2	22
HfA	Huntington fine sandy loam, 0 to 5 percent slopes	56	IIs-6	13
HuA	Huntington silt loam, 0 to 3 percent slopes	56	I-6	8
LaB	Lakin loamy fine sand, 3 to 8 percent slopes	57	IIIs-1	18
LaC	Lakin loamy fine sand, 8 to 15 percent slopes	57	IVs-1	21
LaD	Lakin loamy fine sand, 15 to 25 percent slopes	57	VIIs-2	25
LaE	Lakin loamy fine sand, 25 to 40 percent slopes	57	VIIs-2	25
LaE3	Lakin loamy fine sand, 25 to 40 percent slopes, severely eroded	57	VIIs-2	25
LkA	Lakin loamy sand, 0 to 3 percent slopes	57	IIIs-1	18
LkB	Lakin loamy sand, 3 to 8 percent slopes	57	IIIs-1	18
LsA	Lindside silt loam, 0 to 3 percent slopes	58	IIw-7	12
MaC	Markland silt loam, 6 to 12 percent slopes	58	IIIe-14	16
MbC3	Markland silty clay loam, 6 to 12 percent slopes, severely eroded	58	IVe-9	20
MbD3	Markland silty clay loam, 12 to 25 percent slopes, severely eroded	58	VIe-1	22
McB	Markland and McGary silt loams, 2 to 6 percnt slopes	58	IIIw-5	18
MdB3	Markland and McGary silty clay loams, 2 to 6 percent slopes, severely eroded.	58	IVe-9	20
MeA	Melvin silt loam, 0 to 3 percent slopes	59	IIIw-1	17
MfA	Melvin silty clay loam, 0 to 3 percent slopes	59	IVw-1	21
MgA	Monongahela silt loam, 0 to 2 percent slopes	60	IIw-1	11
MgB	Monongahela silt loam, 2 to 6 percent slopes	60	IIe-13	10
MgC	Monongahela silt loam, 6 to 12 percent slopes	60	IIIe-13	15
MgC3	Monongahela silt loam, 6 to 12 percent slopes, severely eroded	60	IVe-9	20
MoA	Moshannon silt loam, 0 to 3 percent slopes	60	IIw-6	11
MoB	Moshannon silt loam, 3 to 8 percent slopes	60	IIe-6	9
MoC	Moshannon silt loam, 8 to 15 percent slopes	61	IIIe-6	14
MsC	Muskingum sandy loam, 10 to 20 percent slopes	61	IIIe-12	15
MsD	Muskingum sandy loam, 20 to 30 percent slopes	61	IVe-3	19
MsD3	Muskingum sandy loam, 20 to 30 percent slopes, severely eroded	61	VIe-2	22
MsF	Muskingum sandy loam, 30 to 55 percent slopes	61	VIIe-2	24
MsF3	Muskingum sandy loam, 30 to 55 percent slopes, severely eroded	61	VIIe-2	24
MtB	Muskingum silt loam, 3 to 10 percent slopes	61	IIe-10	10
MtC	Muskingum silt loam, 10 to 20 percent slopes	61	IIIe-10	14
MtD	Muskingum silt loam, 20 to 30 percent slopes	61	IVe-3	19
MtD3	Muskingum silt loam, 20 to 30 percent slopes, severely eroded	61	VIe-2	22
MtE	Muskingum silt loam, 30 to 40 percent slopes	61	VIIe-2	24
MuB	Muskingum-Upshur silt loams, 3 to 10 percent slopes	62	IIe-15	10
MuB3	Muskingum-Upshur silt loams, 3 to 10 percent slopes, severely eroded	62	IIIe-15	16
MuC	Muskingum-Upshur silt loams, 10 to 20 percent slopes	62	IIIe-15	16
MuC3	Muskingum-Upshur silt loams, 10 to 20 percent slopes, severely eroded	62	IVe-15	20
MuC4	Muskingum-Upshur silt loams, 10 to 20 percent slopes, very severely eroded	62	VIIe-3	24
MuD	Muskingum-Upshur silt loams, 20 to 30 percent slopes	62	IVe-15	20
MuD3	Muskingum-Upshur silt loams, 20 to 30 percent slopes, severely eroded	62	VIe-3	23
MuE	Muskingum-Upshur silt loams, 30 to 40 percent slopes	62	VIe-3	23
MuE3	Muskingum-Upshur silt loams, 30 to 40 percent slopes, severely eroded	62	VIIe-1	23
MuF	Muskingum-Upshur silt loams, 40 to 55 percent slopes	62	VIIe-1	23
MuF3	Muskingum-Upshur silt loams, 40 to 55 percent slopes, severely eroded	62	VIIe-1	23
MvE	Muskingum-Upshur very stony loams, 30 to 40 percent slopes	63	VIIs-1	25
MvF	Muskingum-Upshur very stony loams, 40 to 55 percent slopes	63	VIIs-1	25
MvF3	Muskingum-Upshur very stony loams, 30 to 55 percent slopes, severely eroded.	63	VIIs-1	25

GUIDE TO MAPPING UNITS AND CAPABILITY UNITS—Continued

Map symbol	Mapping unit	Page	Capability unit	Page
PuA	Purdy silt loam, 0 to 4 percent slopes	63	IVw-1	21
ScA	Sciotoville silt loam, 0 to 3 percent slopes	63	IIw-1	11
ScB	Sciotoville silt loam, 3 to 8 percent slopes	63	IIe-13	10
SeA	Senecaville silt loam, 0 to 3 percent slopes	64	IIw-7	12
So	Sloping land, alluvial materials	64		
TwA	Tilsit and Wharton silt loams, 0 to 3 percent slopes	65	IIw-1	11
TwB	Tilsit and Wharton silt loams, 3 to 8 percent slopes	65	IIe-13	10
TyA	Tyler silt loam, 0 to 2 percent slopes	65	IIIw-5	18
TyB	Tyler silt loam, 2 to 6 percent slopes	65	IIIw-5	18
UcB3	Upshur clay loam, 3 to 10 percent slopes, severely eroded	66	IIIe-30	17
UcC3	Upshur clay loam, 10 to 20 percent slopes, severely eroded	66	IVe-1	19
UcC4	Upshur clay loam, 10 to 20 percent slopes, very severely eroded	66	VIIe-1	23
UhB	Upshur silty clay loam, 3 to 10 percent slopes	66	IIIe-30	17
UhC	Upshur silty clay loam, 10 to 20 percent slopes	66	IIIe-30	17
UmD3	Upshur-Muskingum clay loams, 20 to 30 percent slopes, severely eroded	66	VIe-1	22
UmD4	Upshur-Muskingum clay loams, 20 to 30 percent slopes, very severely eroded.	66	VIIe-1	23
UmE3	Upshur-Muskingum clay loams, 30 to 40 percent slopes, severely eroded	67	VIIe-1	23
UmE4	Upshur-Muskingum clay loams, 30 to 40 percent slopes, very severely eroded.	67	VIIe-3	24
UmF3	Upshur-Muskingum clay loams, 40 to 55 percent slopes, severely eroded	67	VIIe-1	23
UmF4	Upshur-Muskingum clay loams, 40 to 55 percent slopes, very severely eroded.	67	VIIe-3	24
UpD	Upshur-Muskingum silty clay loams, 20 to 30 percent slopes	67	IVe-1	19
UpE	Upshur-Muskingum silty clay loams, 30 to 40 percent slopes	67	VIe-1	22
UpF	Upshur-Muskingum silty clay loams, 40 to 55 percent slopes	67	VIIe-1	23
VaC3	Vandalia clay loam, 8 to 15 percent slopes, severely eroded	68	IVe-1	19
VaD3	Vandalia clay loam, 15 to 25 percent slopes, severely eroded	68	VIe-1	22
VaE3	Vandalia clay loam, 25 to 35 percent slopes, severely eroded	68	VIIe-1	23
VaD4	Vandalia clay loam, 15 to 35 percent slopes, very severely eroded	68	VIIe-1	23
VdB	Vandalia silt loam, 3 to 8 percent slopes	68	IIe-15	10
VdC	Vandalia silt loam, 8 to 15 percent slopes	68	IIIe-15	16
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VsE	Vandalia silty clay loam, 25 to 35 percent slopes	68	VIe-1	22
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WeC	Westmoreland silt loam, 10 to 20 percent slopes	69	IIIe-11	15
WeD3	Westmoreland silt loam, 20 to 30 percent slopes, severely eroded	69	VIe-1	22
WeE3	Westmoreland silt loam, 30 to 40 percent slopes, severely eroded	69	VIIe-1	23
WeF3	Westmoreland silt loam, 40 to 55 percent slopes, severely eroded	69	VIIe-1	23
WfA	Wheeling fine sandy loam, 0 to 3 percent slopes	70	IIs-2	12
WfB	Wheeling fine sandy loam, 3 to 8 percent slopes	70	IIs-2	12
WfC	Wheeling fine sandy loam, 8 to 15 percent slopes	70	IIIs-1	18
WgA	Wheeling gravelly sandy loam, coarse subsoil variant, 0 to 3 percent slopes	70	IIs-2	12
WgB	Wheeling gravelly sandy loam, coarse subsoil variant, 3 to 8 percent slopes	70	IIs-2	12
WsA	Wheeling silt loam, 0 to 3 percent slopes	70	I-4	7
WsB	Wheeling silt loam, 3 to 8 percent slopes	70	IIe-4	9
WsC	Wheeling silt loam, 8 to 15 percent slopes	70	IIIe-4	13
ZoB	Zoar silt loam, 2 to 6 percent slopes	71	IIe-13	10
ZoC	Zoar silt loam, 6 to 12 percent slopes	71	IIIe-13	15
ZoC3	Zoar silt loam, 6 to 12 percent slopes, severely eroded	71	IVe-9	20
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