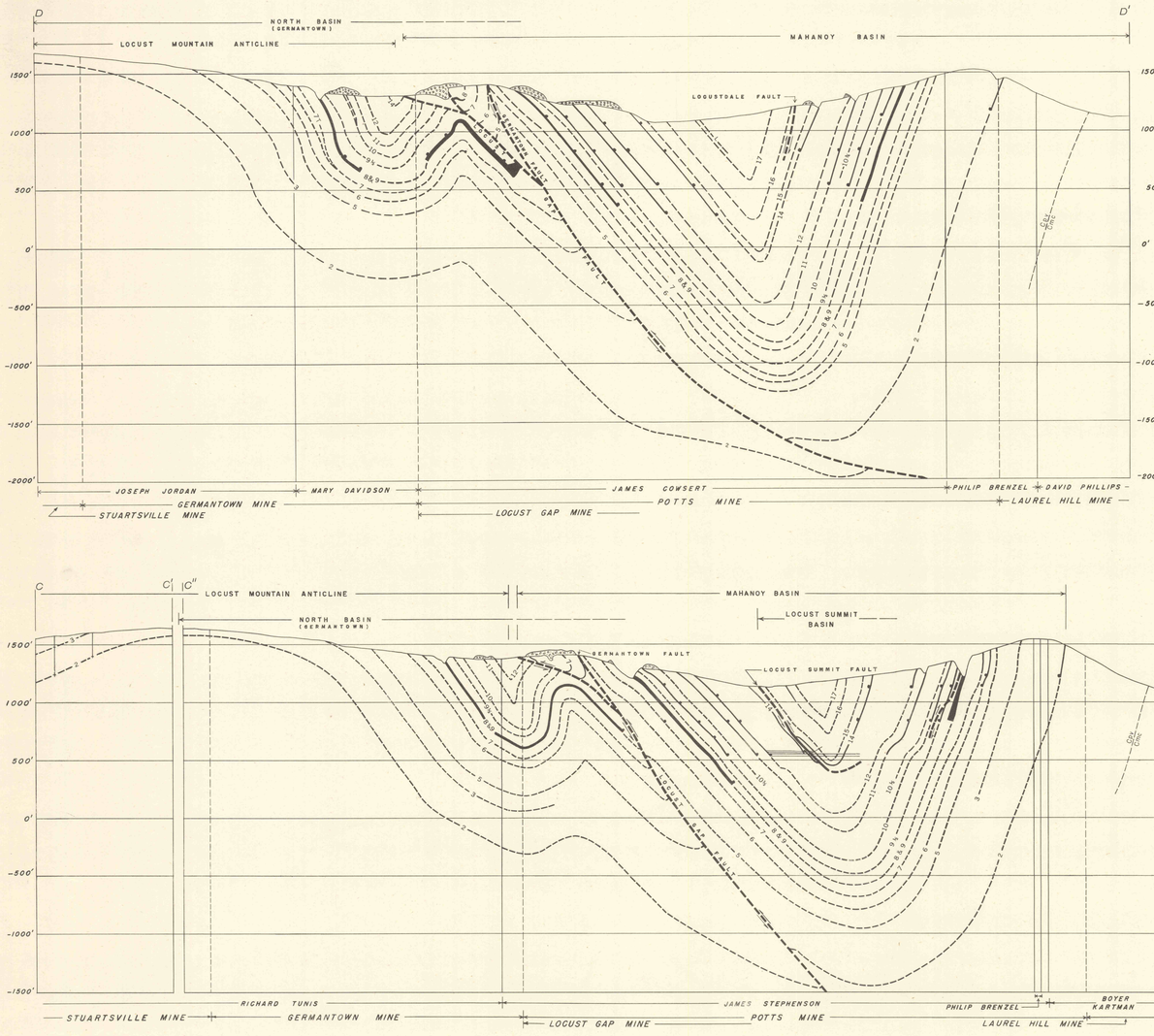
UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

COAL INVESTIGATIONS
MAP C 12 (IN 3 SHEETS) SHEET 3

GEOLOGY OF ANTHRACITE IN THE SOUTHEASTERN PART OF THE MOUNT CARMEL QUADRANGLE, PENNSYLVANIA

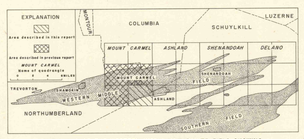


CROSS SECTIONS SHOWING THE STRUCTURE OF THE COAL BEDS IN THE SOUTHEASTERN PART OF THE MOUNT CARMEL QUADRANGLE

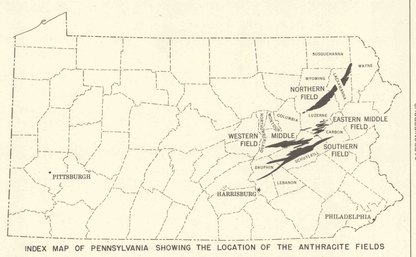
SCALE 1:6 000

500 0 500 1000 2000 3000 Feet

Datum is mean sea level.



INDEX MAP OF THE WESTERN MIDDLE ANTHRACITE FIELD SHOWING THE LOCATION OF THE MAPPED AREAS



INDEX MAP OF PENNSYLVANIA SHOWING THE LOCATION OF THE ANTHRACITE FIELDS

EXPLANATION

Contact between the Mauch Chunk formation (Cmc) and the Pottsville formation (Cpv)

Coal bed with designating number
Solid where mined, dashed where summined, or where exact correlation or position of coal bed is uncertain. Thickness of 15 feet or more is shown where mined.

Fault showing relative movement
Solid where location is known, dashed where uncertain.

Drill hole showing position of coal beds found in core or cuttings
Solid where drill hole is in the plane of the section, dashed where projected to the section.

Cross section of gangway

Tunnel showing position of intersecting gangway
Solid where tunnel is in the plane of the section, dashed where projected to the section.

Mine waste

GEOLOGY OF ANTHRACITE IN THE SOUTHEASTERN PART OF THE MOUNT CARMEL QUADRANGLE, PENNSYLVANIA

INTRODUCTION

This report is the fourth in a series describing the coal deposits of the anthracite fields of Pennsylvania. The three previous reports—Bulletins 961-C, -D, and -E of the U. S. Geological Survey's Coal Investigations series—comprise the general description of the anthracite fields in the Mount Carmel quadrangle.

The Mount Carmel quadrangle is near the center of the Western Middle Anthracite field in the Appalachian Mountains in the east-central part of Pennsylvania. (See index maps of Pennsylvania and the Western Middle field, sheet 1.) The southeastern part of the Mount Carmel quadrangle contains about 104 square miles, most of which is in Northumberland County and a small area in Columbia and Montour counties. The town of Mount Carmel is at the northern boundary of the area; Locust Gap and Excelsior are near the southern and eastern boundaries, respectively.

This report has been prepared to aid in planning exploratory, developmental, and water-control operations by showing: (a) the location of all known coal outcrops (sheet 1), (b) the depth, pitch, and other structural features of representative coal beds (sheet 2), (c) the thickness and composition of representative coal beds and the relationships between the various basins (sheets 1, 2, and 3), (d) the stratigraphy and intervals between coal beds (sheet 3), and (e) a standard nomenclature of the coal beds (sheet 3).

The information presented in this report was obtained in part from actual and abandoned coal mines on mine maps, cross sections, core drill records, and other information made available by the Philadelphia and Reading Coal and Iron Co., the Raven Run Coal Co., the Lehigh Valley Coal Co., and by John P. Brophy, State Mine Inspector.

STRATIGRAPHY

Rocks of the Carboniferous and Quaternary systems crop out in the mapped area. The Carboniferous rocks are, in ascending order, the upper part of the Mauch Chunk formation (Mississippian series), the Pottsville, Allegheny, and the lower part of the Conemaugh formations (Pennsylvanian series). The Quaternary has been deposited along streams upon the eroded surface of these Carboniferous rocks. (See columnar sections, sheet 3.)

MISSISSIPPIAN SERIES

Mauch Chunk formation

The Mauch Chunk formation consists predominantly of lenticular fine-grained red sandstone and red siltstone with occasional thin beds of red claystone. Along Big Run, about a quarter of a mile east of the area, the upper 1,265 ft of the Mauch Chunk is exposed; red sandstone and siltstone make up 60 percent of the exposure and the remainder is red claystone.

The Mauch Chunk formation crops out in the southern part of the area only, as a narrow belt lying in the south side of Mahanoy Mountain. The base is not exposed in the mapped area, consequently the total thickness of the formation is not known. The top of the formation is gradational with the overlying Pottsville formation, and the contact is mapped at that horizon below which the beds are predominantly red and above which they are predominantly gray, green, or brown.

PENNSYLVANIAN SERIES

The Pennsylvanian rocks are composed of conglomerate, sandstone, siltstone, claystone, and coal. The coal beds are the most persistent of these rock types. The other rocks vary rapidly in lithology both vertically and laterally.

Pottsville formation

The Pottsville formation, which conformably overlies the Mauch Chunk formation, includes the oldest Pennsylvanian rocks in the area. This formation is composed mainly of conglomerate, interbedded with subordinate amounts of gray, green, or brown siltstone and sandstone. Red claystone and siltstone are not abundant in the lower part of the formation. The conglomerate pebbles consist mainly of milky quartz, quartzite, black and dark-green chert, black and brown claystone, and gray or green sandstone in a well-indurated, medium-grained sand matrix. Red siltstone and sandstone pebbles are common in the lower part of the formation. The formation is characterized by abrupt lateral changes both in lithology and in thickness. It is very resistant to erosion and forms high prominent ridges. The thickness of the Pottsville formation in the mapped area ranges from 500 to 1,000 ft.

The Lykens Valley No. 2 coal is the only persistent coal bed in the Pottsville formation within the mapped area. Two coal beds of local importance occur above the Lykens Valley No. 2 coal.

Allegheny formation

The Allegheny formation, which conformably overlies the Pottsville formation, contains the most important coal beds in the area. The base of the Allegheny is placed at the bottom of the Buck Mountain (No. 5) coal bed (White, 1990, p. 826). Other important coal beds in this formation in upward succession are as follows: the Seven-foot (No. 6), Skidmore (No. 7), Mammoth zone (Nos. 8, 8½, and 9), and the Four-foot (No. 10½) beds. Conglomerates, sandstone, siltstones, claystones, and coal beds of lesser importance separate these coal beds. In some places a light-brown siltstone containing large ovoid ironstone concretions occurs at the base of the Mammoth. Bottom Split (No. 8) coal bed and can be used for correlation. A massive-bedded conglomeratic sandstone above the Mammoth Top Split (No. 9) coal bed is also locally useful for correlation. The Allegheny formation ranges in thickness from 547 ft in the northwestern corner of the area to nearly 800 ft in the east-central part.

Conemaugh formation

The Conemaugh formation lies conformably on the Allegheny formation. At the base of the Conemaugh is the Holmes (No. 10) coal bed (Lohman, 1937, p. 40). Seven persistent coal beds and several local coal beds occur in the lower part of the formation. These beds are separated by beds of sandstone, siltstone, and claystone; lenticular beds of conglomerate occur above the Holmes, Little Orchard, and Little Tracy coal beds. (See columnar section, sheet 3.) The upper part of the formation has been eroded, leaving only the lower 1,500 ft in the area covered by this report.

QUATERNARY DEPOSITS

Unmapped deposits of boulders, gravel, sand, and silt occur in the valleys but are covered in many places by refuse from the mines and breakers.

STRUCTURE

Each of the Pennsylvanian anthracite fields is a composite syncline consisting of a group of structural basins or overlapping folds, some of which have been faulted. The general trend of these folds is northeastward. The synclines are called basins by the miners, a practice that is followed in this report. The term generally designates a complete syncline consisting of a trough and two limbs, but in some places it is applied to the exposed part of a faulted syncline, as in the North, New, and Locust Summit basins. (See cross section A''—A''' and B''—B''' sheet 3.)

The mapped area includes the south half of the composite syncline that is the Western Middle field and extends south of the coal-bearing rocks to include part of the non-coal-bearing anticline between the Western Middle and the Southern anthracite fields. Measurements on the Lykens Valley No. 2 coal bed show a maximum structural relief of approximately 3,750 ft, as measured in the North basin from a point 2,000 ft below sea level on the projection of the coal bed to 1,750 ft above sea level on the Locust Mountain anticline. (See cross section D-D', sheet 3.)

FOLDS

The folds in the area are asymmetrical, with both northward- and southward-dipping axial planes. Some of the folds are elevque, as exemplified by the Alaska basin in the north (cross section A''—A''', sheet 3); others are acute, as exemplified by the Mahanoy basin in the south (cross section D-D').

The principal basins, listed from south to south, are the Mount Carmel, Alaska, North, and Mahanoy basins. The north-dipping limb of the Mount Carmel basin crosses the northwest corner of the area. The Alaska basin, immediately south of the Mount Carmel basin, is a southwestward-plunging syncline that dies out in the northwestern part of the mapped area. The North basin, a prominent structure in this part of the Mount Carmel quadrangle, extends across the mapped area. It is essentially the north limb of a basin that has been truncated by the Locust Gap fault. The forth has been folded into several anticlines and synclines, to which such local names as Germantown basin and Stuartsville anticline have been given. The Locust Summit and Locust Gap faults, the Mahanoy basin, to the south, in the area. It is an asymmetrical syncline that plunges eastward; being 500 ft deeper in the eastern part of the area than in the western part. The Mahanoy basin is complicated by close folding and chevé faulting that has formed the New, Locust Summit, and Laurel Hill basins. These subsidiary basins die out eastward as displacements on the Locust Spring and Locust Summit faults, which in turn decrease until they eventually merge into the limbs of the Mahanoy basin.

FAULTS

Most faults in the area are thrusts and are the result of compression. The largest faults are longitudinal and are parallel with the strike of the folds. The most prominent of these is the Locust Gap fault, which traverses the entire area; others of importance are the Germantown, Locust Spring, Locust Summit, and Locustdale faults. The Locust Gap fault cuts the beds at angles ranging from less than 1° to more than 15° and displaces them as much as 2,000 ft. Folding subsequent to the development of this fault has tilted the fault plane so that at depth it now dips from about 35° S. in the western part of the area to almost 60° S. in the eastern part of the area. The Germantown fault, and other faults that are branches of the Locust Gap fault, apparently formed in the eastern part of the area as the Locust Spring and Locust Summit faults died out.

The Locust Spring fault, a prominent fracture in the southwestern part of the Mount Carmel quadrangle, and the Locust Summit fault, prominent in the eastern part of the area, are broad overlapping thrust faults that have been folded in such a manner that the northern limb of the Locust Spring fault and the southern limb of the Locust Summit fault have become nearly vertical in large faults that extend above sea area of no displacement at their eastern ends.

The Locustdale fault in the east-central part of the area represents another type of longitudinal fault. It is a high-angle shear resulting from compression of the strata in the center of the folds. This fault, which transects the beds at angles ranging from less than 1° to about 15°, in a north-dipping reverse fault along which younger beds in the hanging wall are uplifted with respect to the older beds in the footwall.

Oblique faults which are so nearly parallel with the bedding that they cut only a few coal beds occur at angles of about 65° to the trend of the major folds. Compared with the longitudinal faults they have small displacements, but they are important in mining. Some have caused dense zones, in which the coal is sheared and crushed to such an extent that mining is not profitable, or pinch faults, in which the coal is squeezed out from between the top rock and the floor rock.

NOMENCLATURE AND CORRELATION OF THE COAL BEDS

Coal beds in the anthracite fields are generally known as veins, following very early custom. As the term "vein," in geologic usage, refers to a mineral deposit filling a fissure in the rock, and as most coal beds in this area do not occupy fissures, the name is not applicable to deposits of coal. In this report, therefore, the coal deposits are called coal beds.

The coal beds are designated by numbers or numbers, or by both, but the nomenclature has not been standardized. In the early days of mining, different names were given to beds in isolated mines and no correlation was attempted. Some of the early erroneous correlation has been corrected but many problems of correlation still exist because of gaps between mine workings, complexity of structure and lithology, the scarcity of outcrops, and the difficulty of changing established records.

The names of the coal beds used in this report conform to the consensus of usage among operators and to the nomenclature of the previous reports of this series. These names do not necessarily agree with those used in the reports of the Second Geological Survey of Pennsylvania which conformed to local usage only (Ashburner, 1885, p. 84).

DESCRIPTION OF THE COAL BEDS

The coal beds in the mapped area occur in the upper half of the Pottsville formation, throughout the Allegheny formation, and in the lower part of the Conemaugh formation. (See columnar sections, sheet 3.) The younger coal beds that occur elsewhere in the anthracite fields have been removed by erosion from this area.

Natural outcrops of coal are seldom found because of the cover of soil. The outcrops shown on sheet 1 indicate the positions on the surface of the ground that the coal would occupy if it were projected through this cover. This position may not agree with blooms of weathered coal and numerous prospect pits, because the coal may be dipping or the ground may slope, as it does in various distances down the slope from their original position. Explanation for the unweathered coal, therefore, should be sought at the position of the outcrop shown on the map and extended in the direction of dip of the seam.

Coal beds less than 15 ft (18 in.) thick are generally not recorded in this report. Unnamed coal beds 18 in. or more thick, that occur within a relatively small area and are lenticles or splits from named beds, are herein termed "local" beds, and are shown on sheet 1 only where mined or located by prospecting. Outcrops of some of the more persistent beds are shown for long distances beyond any known points of outcrop. They indicate the authors' estimate of the position of the horizon of the bed but do not signify that the bed is necessarily minable throughout this extent.

INTERVALS BETWEEN COAL BEDS

The intervals between the coal beds vary considerably. The interval between the No. 1 and No. 2 coal beds ranges from upward from 1700 ft in the western part of the area to 500 ft in the eastern part, and the interval between the No. 8 and the No. 2 coal beds thickens from 700 ft in the north to 400 ft in the south. The splitting and merging of the Mammoth coal zone and the occurrence of local beds above the Mammoth zone account for the greatest variations, but no regular trend has been observed.

THICKNESS OF THE COAL BEDS

The coal thicknesses shown in this report were obtained chiefly from underground measurements made by the operators. These measurements, selected from a great many such observations, were chosen so as to reflect the normal thickness of the bed and to included coal in core tests 1,000 ft square. Wherever possible, at least four measurements were averaged for each coal area. Measurements that were considered to be abnormally affected by structural deformation, such as faulting, pinching, or swelling, were not used. Some thicknesses were measured in drill holes and in outcrops, but these data do not increase the average and range of thickness of these coal areas in the mines of the mapped area. These figures generally are in agreement with the thickness of the coal beds shown on the columnar sections, but not necessarily so, because the columnar sections represent only parts of the area and contain scattering data, recent measurements in mines, and other data that may have been excluded from the thickness in the coal areas within the mines.

AVERAGE AND RANGE OF THICKNESS OF COAL BEDS MINED IN THE SOUTHEASTERN PART OF THE MOUNT CARMEL QUADRANGLE

Bed number	Thickness: Bed, Average	Bed, Range	Coal, Average	Coal, Range	Percentage of refuse
	Ft. In.	Ft. In.	Ft. In.	Ft. In.	
17	4 8	2 6 – 8 4	4 0	2 0 – 6 0	14.0
16	4 0	2 6 – 8 4	3 10	2 0 – 5 8	23.0
15	5 3	2 3 – 10 0	3 10	2 0 – 5 10	27.0
14	5 5	2 3 – 12 10	3 9	2 4 – 5 3	29.0
13	4 9	2 0 – 9 0	3 6	2 0 – 5 0	25.0
12	6 5	3 0 – 10 3	5 5	3 0 – 7 8	15.2
11	8 7	2 0 – 15 5	5 7	4 6 – 7 2	12.7
11L	8 4	5 5 – 11 10	5 9	3 10 – 7 5	15.8
10½	5 6	3 0 – 9 0	4 11	2 1 – 7 2	5	40.0
10½	4 5	3 0 – 5 4	3 11	2 4 – 5 0	11.5
10T					
10	5 1	1 0 – 11 8	4 4	0 8 – 11 1	14.7
9½	4 6	2 5 – 12 3	3 8	0 6 – 9 11	17.7
9	9 5	5 1 – 27 0	6 9	3 0 – 13 5	9.5
8½	10 11	4 1 – 28 0	9 4	1 5 – 31 0	14.6
8	8 11	1 6 – 25 0	7 7	0 8 – 25 0	14.0
8 and 9	24 4	4 10 – 57 0	19 6	4 8 – 57 0	19.7
7	7 7	1 0 – 14 0	5 5	0 6 – 9 7	27.0
6	5 5	1 11 – 9 9	4 4	0 6 – 7 6	20.2
5	9 11	1 8 – 35 0	5 5	0 6 – 8 6	45.7
4					
3	5 1	2 0 – 10 6	4 8	1 0 – 10 6	7.8

COAL BEDS OF THE POTTSVILLE FORMATION

Lykens Valley No. 2 coal bed

The Lykens Valley No. 2 coal bed, the oldest coal bed in the mapped area, crops out on the south side of Mahanoy Mountain, in the southern part of the area. The No. 2 bed contains less than 6 percent refuse, which is less than any other coal bed in the area covered by this report. It is mined in the northwestern part of the area in the Reliance and Alaska mines and has been mined both underground and by stripping in the Locust Gap, Locust Spring, and Mahanoy mines on the south flank of Mahanoy Mountain. That part of the bed was obtained only by the Alaska-Reliance mine area, where it was mined underground in the southwestern part of the mapped area a bed designated as 2L occurs from 2 to 12 ft above the Lykens Valley No. 2 coal, and is probably the same bed as one that occurs in a similar position in the adjoining area to the west.

Whites (No. 3) coal bed

The Whites (No. 3) coal bed, which lies about 200 ft above the Lykens coal, crops out on both sides of Locust Mountain in the north, and along the crest of Mahanoy Mountain in the south. The bed has not been mined in the mapped area but it has been cut in hore holes in the Buzzelville and Locust Spring mines. No reliable data on thickness of the coal are available to the authors.

COAL BEDS OF THE ALLEGHENY FORMATION

Buck Mountain (No. 5) coal bed

The Buck Mountain (No. 5) coal, at the base of the Allegheny formation, crops out on both flanks of the Locust Mountain anticline, in the Mahanoy basin, and in the Laurel Hill basin, where it has been extensively strip-mined in conjunction with the Buck Mountain bed in the Reliance mines and has been mined both underground and by stripping in the Locust Gap, Locust Spring, and Mahanoy mines. The bed contains less than 6 percent refuse. The thickness of the No. 5 bed is especially variable, ranging from 1 ft 6 in. to 15 ft 1 in. within the mapped area.

Seven-foot (No. 6) coal bed

The interval between the Seven-foot (No. 6) coal bed and the Buck Mountain coal bed increases northwestward from 75 to 95 ft in the southern part of the area to a maximum of 120 ft in the northwestern part. The Seven-foot coal bed crops out on both sides of Locust Mountain and on the south side of Mahanoy Mountain. It has been extensively strip-mined on the north side of Locust Mountain and has been strip-mined in conjunction with the Buck Mountain bed on the north side of Mahanoy Mountain. The bed also crops out in the west-central part of the area, south of the Locust Gap fault in the Mahanoy basin.

The Seven-foot coal has been mined underground in the northwestern part of the area in the Alaska basin, in the east-central part of the Mahanoy basin, and in the Laurel Hill mine. This bed is thickest in the southwestern and southeastern parts of the mapped area and thinnest in the southeastern part. The Seven-foot coal bed ranges from 1 ft 11 in. to 9 ft 9 in. in thickness in the mapped area and contains an average of 20 percent refuse.

Skidmore (No. 7) coal bed

The Skidmore coal bed, which is separated from the Seven-foot coal bed by 60 to 100 ft of sandstone and claystone, crops out in all the basins in the mapped area. In the eastern part of the Locust Spring mine three splits of the Skidmore bed have been mined, and stretching and independent mining has exposed two splits in the western part of the Germantown mine. The Skidmore has been mined underground in the Locust Spring, Locust Gap, and Potts mines, where the bed averages in thickness from 1 ft 0 in. to 14 ft 3 in. and has an average refuse content of 27.6 percent.

Mammoth coal zone

The base of the Mammoth coal zone is 215 ft stratigraphically above the Buck Mountain coal bed. This interval, however, tends to increase in the eastern part of the mapped area. The Mammoth coal zone in this area contains, in ascending order, of the Bottom Split (No. 8) coal, the Middle Split (No. 8½) coal, a local coal bed called the Local Split (No. 8R) coal, and the Top Split (No. 9) coal. The splits are separated by claystones, the intervals between the Bottom Split and the Top Split or Bottom Splits of the zone vary considerably throughout the area. In some localities the Middle Split and Top Split were recorded and mined as one bed, and in other places the Middle Split and Bottom Split appear to merge. In many places the partings between the splits are so thin that the entire Mammoth zone is mined as one bed, as in parts of the Locust Spring, Locust Gap, Potts, and Germantown mines. In such places thicknesses as great as 57 ft are recorded. The average thickness of the coal in the zone, exclusive of waste and partings, is 10 ft 6 in.

Mammoth Bottom Split (No. 8) coal bed. The Bottom Split (No. 8) coal crops out in all the basins in the mapped area and has been extensively strip-mined. It is mined underground in the Locust Spring, Locust Gap, Alaska, and Reliance mines, where its thickness ranges from 1 ft 6 in. to 25 ft 8 in. The average thickness of the bed is about 9 ft, of which about 15 percent is refuse.

Mammoth Middle Split (No. 8½) coal bed. The Mammoth Middle Split coal bed, where it is mined separately, is from 10 to 50 ft above the Mammoth Bottom Split coal bed. The Middle Split crops out in the New and Mahanoy basins in the southwestern part of the mapped area. It is 1 ft 7 in. to 10 ft 8 in. thick in the Locust Spring mine, where it is mined as a separate bed.

Local Split (No. 8R) coal bed. In the southwestern part of the mapped area, a few feet below the Top Split, a local coal bed called the No. 8R by the authors has been recognized but has not been mined. Immediately west of the mapped area, this local bed was mined by underground methods and by surface stripping. As no corresponding coal is found elsewhere in the mapped area, it is assumed that the No. 8R coal merges into the No. 9 coal to the east.

Mammoth Top Split (No. 9) coal bed. The Mammoth Top Split (No. 9), where present, is from 10 to 70 ft above the Mammoth Middle Split and is stratigraphically above the Mammoth Bottom Split. Where the Middle Split is absent the Top Split may be as much as 100 ft above the Bottom Split. The Top Split crops out on the south flank of Locust Mountain and in the central part of the mapped area in the Locust Summit and Mahanoy basins. In the Locust Spring, Locust Gap, Alaska, and Reliance mines the bed, as shown by mining records, is 5 ft 1 in. to 17 ft 6 in. thick, and the included coal has an average thickness of 8 ft 6 in.

Four-foot (No. 9½) coal bed

The Four-foot coal bed lies 50 to 180 ft stratigraphically above the horizon of the Mammoth coal zone. The larger interval is in the southern part of the mapped area, in the Mahanoy basin, where a conglomeratic sandstone intervenes. The Four-foot coal crops out in all the basins in the mapped area and has been mined locally in the Locust Spring, Potts, Alaska, and Reliance mines. The coal ranges in thickness from 2 inches to 9 ft 2 in., and the average thickness of the bed in the mines is 4 ft 6 in., of which 14.7 percent is refuse.

Holmes Lauder (No. 10L) coal bed

The Holmes Lauder is a local coal bed that lies on the south dip of the Mahanoy basin in the southeastern part of the mapped area. The bed has not been mined but has been cut in tunnels in the Potts mine, and occurs 10 to 20 ft under the Holmes (No. 10) coal bed in that area. No information regarding thickness of bed or coal is available.

COAL BEDS OF THE CONEMAUGH FORMATION

Holmes (No. 10) coal bed

The Holmes (No. 10) coal bed, at the base of the Conemaugh formation, ranges from 100 to 270 ft above the horizon of the No. 8 coal bed. The Holmes coal, which, save to the Mammoth coal zone, is the most extensively mined bed in the area, crops out in all of the major basins. It is mined in the Alaska, Reliance, Locust Spring, Locust Gap, Potts, and Germantown mines, where the average thickness of the bed and an included coal is 5 ft 6 in., and of 8 ft 6 in., respectively.

Holmes Top Split (No. 10T) coal bed

A local bed, the Holmes Top Split (No. 10T) coal, splits from the Holmes coal bed in the central part of the area. It has been found in an exploration trench south of the Mexican shaft of the Germantown mine and in diamond drilling in the same area. The Holmes Top Split has been mined locally, but no information on thickness is available. Drill-hole records show coal 6 ft 2 in. thick.

Rough (No. 10Sg) coal bed

The Rough (No. 10Sg) coal bed, which is about 60 ft stratigraphically above the Holmes coal, is not a persistent bed. It crops out in the Locust Spring mine and in exploration trenches in the Potts mine. It is mined, where it occurs, in the Mahanoy, Locust Summit, and New basins. The Rough coal has been mined underground in the northern part of the area and in the Mahanoy and Locust Summit basins. The average thickness of the coal in this bed in the mined area is about 4 ft.

Local (No. 10Sg) coal bed

The Local (No. 10Sc) coal bed is mined in the northwestern part of the mapped area and in the east-central part of the Mount Carmel quadrangle (Rothrock et al., 1953). A bed that is correlated with the No. 10Sc coal crops out on the south side of Locust Mountain and on the north side of Mahanoy Mountain. The average thickness of the bed in the mined area is 5 ft 6 in., and 40 percent of this is refuse.

Primrose (No. 11) coal bed

The Primrose (No. 11) coal bed is about 230 ft stratigraphically above the Holmes coal bed in the western part of the area and 150 to 170 ft above it in the eastern part. This thinning of interval, which continues eastward into the adjoining area, is accounted for by loosing of the conglomeratic beds above the Holmes. The Primrose crops out in all the major basins in the area except the Alaska basin; it has been mined in the Potts, Locust Spring, Locust Gap, and Germantown mines. The Primrose is one of the better coal beds in the area and averages about 4 ft in thickness, with little waste.

Orchard (No. 12) coal bed

The Orchard (No. 12) coal bed is 80 to 100 ft stratigraphically above the Primrose coal. The intervening rock is mostly claystone. The Orchard coal crops out in the North, Mahanoy, and Mount Carmel basins and has been mined underground in the Potts, Locust Spring, and Reliance mines. This coal bed is locally 10 ft 3 in. thick, but its average thickness is only 4 ft 5 in.

Little Orchard (No. 13) coal bed

The Little Orchard (No. 13) coal bed is about 130 ft stratigraphically above the Orchard coal in the western part of the area, but this interval thins to 60 ft in the east. The intervening rocks consist of claystones and sandstones. The Little Orchard occurs locally in the New, Mahanoy, and Locust Summit basins, where it has been cut in tunnels and diamond-drill holes in the Locust Spring mine and has been mined in the Potts mine. The average thickness of the bed in the mined area is 4 ft 6 in., 15.5 percent of which is waste.

Diamond (No. 14) coal bed

The Diamond (No. 14) coal bed lies 250 ft stratigraphically above the Orchard coal. In the mapped area the Diamond occurs in the New, Locust Summit, Mahanoy, and Germantown basins and is mined in the Germantown, Locust Spring, and Potts mines. The bed is 3 ft 5 in. to 12 ft 10 in. thick and contains 30 percent of waste.

Little Diamond (No. 15) coal bed

The Little Diamond (No. 15) coal bed is about 20 ft above the Diamond coal in a tunnel and in local workings in the Locust Spring and Potts mines, where the coal averages 2 ft 10 in. in thickness.

Tracy (No. 16) coal bed

The Tracy (No. 16) coal bed lies approximately 100 ft stratigraphically above the Diamond coal bed. It is exposed in the coal-bearing basins. The Tracy coal has been mined underground in the Locust Spring, Locust Gap, and Potts mines. The average thickness of the Tracy bed in the mined area is 4 ft, 25 percent of this is refuse.

Little Tracy (No. 17) coal bed

The Little Tracy (No. 17) coal bed is the youngest coal in the mapped area. It occurs in the southeastern part of the area in the Mahanoy basin where it is approximately 200 ft stratigraphically above the Tracy coal. The Little Tracy has not been mined but has been cut in diamond-drill holes in the Potts mine and in the Keystone washboard tunnel. Core-drill records show the bed to be 4 ft 8 in. thick and the included coal to be 4 ft thick.

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COMPOSITE OF THE MAPPED AREA

System	Series	Formation	SECTION	Bed designation: Name	No.	Thickness in feet*
QUATERNARY	RECENT	UNCONFORMITY				
Conemaugh				Little Tracy	17	
				Tracy	16	203
				Little Diamond	15	165
				Diamond	14	30
				Little Orchard	13	129
				Orchard	12	100
				Primrose	11	98
				Local	10¾	53
				Rough	10 Vz	52
				Top Split / Holmes / Local	10T / 10 / L	61
				Four-foot	9½	51
				Top Split / Upper Split / Middle Split / Bottom Split	9 / 8½ / 8 / 8	88
				Skidmore	7	65
				Seven-foot	6	60
				Buck Mountain	5	90
				Whites	3	141
				Lykens Valley	2	367

*Thickness figures represent the intervals between the bottoms of adjacent coal beds averaged for the entire mapped area

RELIANCE MINE

SECTION	Operator's designation: Name	No.	Thickness in feet
	Diamond	14	3–10
	Orchard	12	1–3
	Primrose	11	28–55
	Local		1–5
	Four-foot	9½	60–75
	Top Split	9	3–15
	Bottom Split	8	3–16
	Holmes	10	80–140
	Skidmore	7	1–8
	Seven-foot	6	80–120
	Buck Mountain	5	2–7
	Whites	3	120–153
	Lykens Valley	2	1–11

MAHANOY BASIN

SECTION	Operator's designation: Name	No.	Thickness in feet
	Little Tracy	17	4–5
	Tracy	16	2–9
	Little Diamond	15	2–5
	Diamond	14	2–9
	Little Orchard	13	1–9
	Orchard	12	2–9
	Primrose	11	3–15
	Holmes	10	1–7
	Local	L	1–7
	Four-foot	9½	1–7
	Top Split	9	3–18
	Middle Split	8½	4–17
	Bottom Split	8	4–19
	Skidmore	7	1–9
	Seven-foot	6	1–5
	Buck Mountain	5	2–13
	Whites	3	1–4
	Lykens Valley	2	2–7

EXPLANATION OF COLUMNAR SECTIONS

Conglomerate
Sandstone
Claystone
Siltstone
Red Claystone
Coal
No reliable data

COLUMNAR SECTIONS

0 100 200 300 400 500 Feet
VERTICAL SCALE

Prepared in 1950 from data supplied by the Raven Run Coal Co., Lehigh Valley Coal Co., and the Philadelphia and Reading Coal and Iron Co., with modifications by the U. S. Geological Survey.

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C.

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1953

COAL INVESTIGATIONS
MAP C 12 (IN 3 SHEETS) SHEET 3
For sale by U. S. Geological Survey, price $1.50 per set