WATERSHED DESCRIPTION

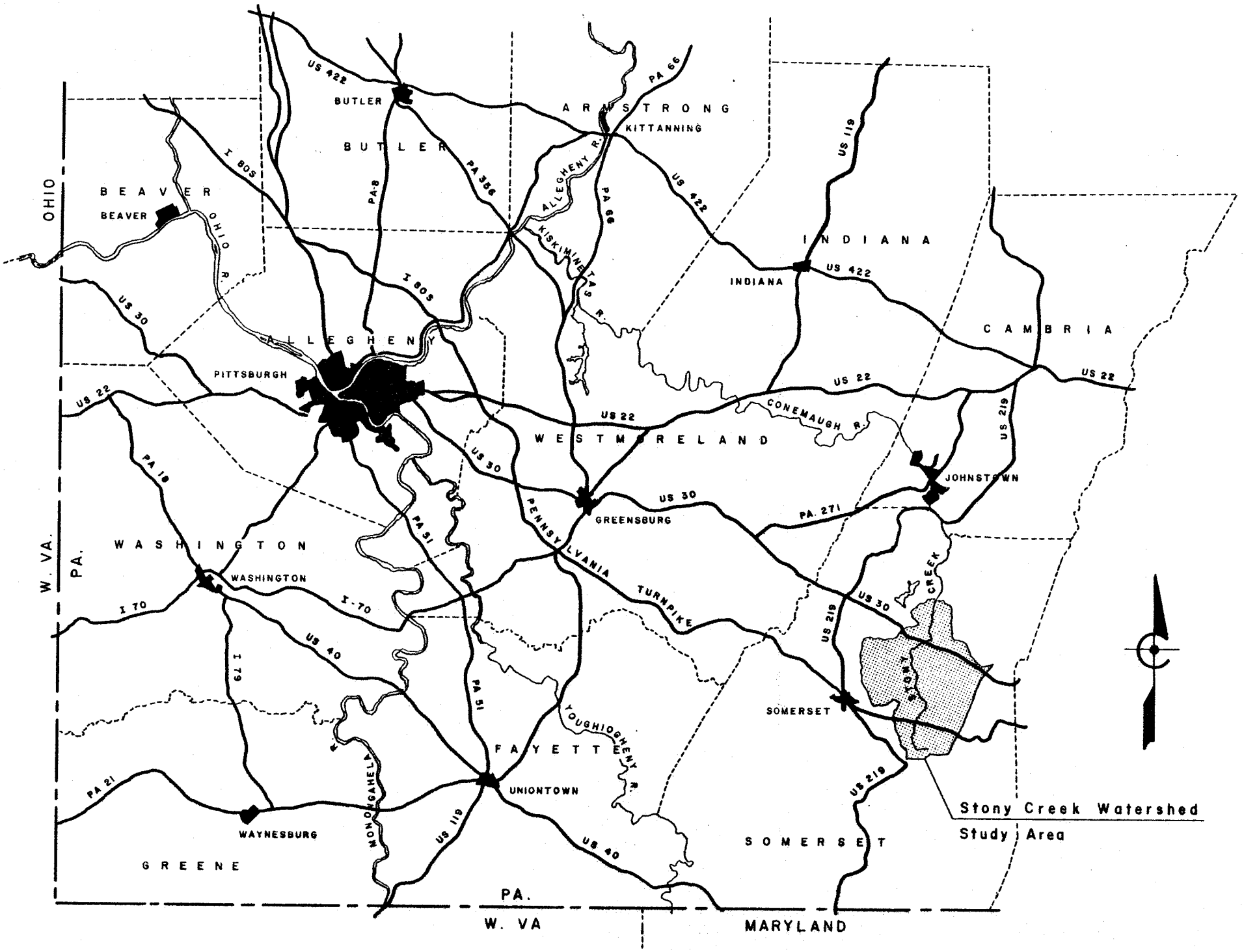
Physioqraphy

The study area of the Stony Creek Watershed as seen on the General Watershed Location Map, p. 19, is situated in the central, eastern section of Somerset County, Pennsylvania. The center of the watershed is located approximately eight (8) miles northeast of the town of Somerset. It has an irregular shape with a maximum length of seventeen (17) miles and a maximum width of fifteen (15) miles. It encompasses one hundred thirty-nine (139) square miles or eighty-nine thousand eight (89,008) acres. Stony Creek itself, within the study area, has a length of twenty-three and two-tenths (23.2) miles as it flows northward through the basin from its beginning near Berlin. Feeding this length of Stony Creek are two hundred thirty-five (235) miles of tributaries and eight hundred seventy-two (872) acres of ponds and lakes.

The study area portion of the Stony Creek Watershed is bounded on the northwest, north, and northeast by the remaining portion of the Stony Creek Watershed that is not part of this project, on the west by the Coxes Creek Watershed, on the south by the Buffalo Creek Watershed and to the east by the Juniata River Watershed.

A wide, low flood plain exists at the head waters of Stony Creek and extends to the south central section of the study area. However, as the creek meanders northward, it enters an area of steep flanking hills, and although there are areas that have a wide flood plain in the central and northern sections, the flanking inclines, 400 to 500 feet high, remain to the end of the study area at Hooversville.

The complete Stony Creek Watershed drains an area of 466 square miles. The stream flows northward through Somerset and Cambria Counties to Johnstown where it joins the Little Conemaugh River to form the Conemaugh River. The Conemaugh River meanders in a westerly direction toward Saltsburg where it is joined by the Loyalhanna Creek forming the Kiskiminetas River. The Kiskiminetas River flows in a northwesterly direction to a point slightly north of the town of Freeport where it empties into the Allegheny River.



GENERAL WATERSHED LOCATION

Geographic and Geologic Relations

The study area of the Stony Creek Watershed forms a part of the Appalachian Highlands, which extend from the Coastal Plain to the Interior Plains and from Alabama to Canada. In Pennsylvania the Appalachian Highlands are divided into two almost equal parts by the escarpment known as the Allegheny Front. East of this escarpment lies a belt of northeastward-trending ridges and valleys known as the Appalachian Valley and Ridge province. To the west of the Allegheny Front, which forms the southeastern boundary of this study area, is the Appalachian Plateau province. This province is a broad highland belt that is underlaid by gently folded carboniferous and older strata. The study area is situated mainly in this province.

The Appalachian Plateau forms a dissected upland that consists of rolling hills and valleys surmounted in its eastern portion by several high ridges. Rocks that crop out on the Appalachian Plateau are chiefly of the Carboniferous Age or System. These rocks are divided into two series, the Mississippian, which is the lower of the two, and the Pennsylvanian series of which we are primarily concerned.

The rocks within the study area, in accordance with their situation near the margin of the Appalachian Plateau, are folded into a series of pronounced anticlines and synclines. The relation of the structure, in the Watershed, to the geologic structure in southwestern Pennsylvania emphasizes the northeastward trend; the general decrease in the steepness of the folding from east to west; the persistence of many miles of the main axis of folding; the development of secondary folds; the local curvature of the axis; and the occurrence of knobs and depressions along the axis.

The structure is indicated on Drawing 7119-2 by means of contour lines. The contour lines show the strike and dip of the beds, the positions of the anticlinal and synclinal axes and some details of folding. In the study portion on the Stony Creek Watershed, the contours shown on this drawing are based on the bottom of the Lower Kittanning coal.

Geoqraphic and Geoloqic Relations (contd.)

The two chief arches of the Watershed are the Negro Mountain Anticline and the Allegheny Front. The Negro Mountain Anticline persists beyond the limits of the study area as does the Allegheny Front. The Somerset and Berlin Synclines, which lie respectively west and east of the Negro Mountain Anticline are strongly developed basins.

The Somerset Syncline --- This syncline is a curved fold that trends northeastward. It is approximately 17 miles long, between 7 and 8 miles wide and is located in the western part of the Watershed. On its eastern limb, the dips of the syncline are fairly regular and carry the Lower Kittanning coal from an elevation of more than 2,400 feet down to an elevation of approximately 1,500 feet.

The Negro Mountain Anticline --- This anticline is a prominent geographic feature within the Watershed. It is much more developed in its southern portion, outside of the Watershed boundaries, along the Casselman River, between the towns of Rockwood and Garrett, where the Mauch Chunk shale is brought to the surface. Northward, however, the fold decreases in intensity and disappears shortly after it leaves the northern boundaries of the study area.

The Negro Mountain Anticline, throughout the greater part of its extent in this area, is a flat-topped regular fold between 7 and 8 miles wide from base to base.

The horizon of the Lower Kittanning coal lies at an elevation slightly more than 2,400 feet above sea level along the crest and descends to less than 1,200 feet in the Berlin Basin on the east and to less than 1,500 feet in the Somerset Basin on the west. In the northern extremity of the anticline where it leaves the study area, the dips are somewhat undulating.

The Berlin Syncline --- This syncline lies between the Negro Mountain Anticline and the Allegheny Front and is a typical canoe-shaped basin in which the rocks rise along the axis in both directions from the center of the trough.

Geoqraphic and Geoloqic Relations (contd.)

As in the case of the Negro Mountain Anticline, the Berlin Syncline terminates shortly after it leaves the Study area boundaries. Along the plunging axis of this syncline, the Lower Kittanning coal descends from an elevation of 2,250 feet to less than 1,200 feet above sea level within a distance of about 10 miles, and along both limbs of the syncline the rise of the rocks is greater. The steepest dips are along the southeastern limb, near the south boundary of the Watershed, here the reference coal bed rises from an elevation of 1,200 feet along the axis of the fold to 2,300 feet at the outcrop, one and one-half miles distance. On the northwest limb the same rise occurs in two and one-half miles.

Rocks outcropping in the Watershed, as mentioned earlier, belong to the Carboniferous and Devonian system. However, one reference book* mentioned a third, the Quaternary System. This system is represented by sand, clay, and gravel that streams have deposited along their valleys in time of high water. These deposits, according to the author are extensive in the valley of Stony Creek. Although we cannot find any reference to this system in the Geologic Atlas*(1), we have, however, located on the geologic maps the Quaternary System south of the Watershed in the Casselman Creek Valley and the Laurel Hill Creek Valley. Further investigation, however, shows that the Quaternary is a subdivision of the Cenozoic system which some geologists prefer to divide into two systems; the other being the Fertiary. The Quaternary system of this division includes the Pleistocene epoch, and the Fertiary system includes the Paleocene through the Pliocene epochs.

* Bituminous Coal Fields of Pennsylvania, Part II, by James D. Sisler.
*(1) Somerset-Windber Folio Number 224. (2) Geology and Mineral Resources of Southern Somerset County, Pennsylvania, by Norman K. Flint.

Geoqraphic and Geoloqic Relations (contd.)

The Carboniferous System is divided into two series, the Pennsylvania and the Mississippian. The groups belonging to the Pennsylvania series are the Monongahela, Conemaugh, Allegheny, and the Pottsville formations. The groups belonging to the Mississippian series are the Mauch Chunk shale, the Loyalhanna and the Pocono formations.

The Monongahela formation is confined in the Watershed, almost entirely to the hilltops just north of the town of Berlin which is the southern extremities of the study area. It contains two workable coal beds, the Pittsburgh and Pittsburgh Rider. The Pittsburgh coal which lies at the base of the Monongahela formation is the most persistent and valuable coal bed in western Pennsylvania, where it underlies an area of more than 2,000 square miles and averages possibly 7 feet in thickness. However, in the Stony Creek Watershed it is sparsely represented and is seldom mined.

The Conemaugh formation includes the beds that lie between the Upper Freeport coal at the top of the underlying Allegheny formation and the Pittsburgh coal at the base of the Monongahela formation.

This formation occupies considerable portions of the Watershed, most notably along the western sides of the Allegheny Front and in the south, north of the town of Berlin. Elsewhere, erosion has removed the upper members of the formation and its entire thickness is present only in small areas.

The Conemaugh formation consists of a variable sequence of sandstone, shale, clay, and thin beds of limestone and coal. It is characterized by the occurrence of red beds, the first above the Mauch Chunk shale and by the presence in its lower half of several calcareous beds that contain marine fossils.

The Conemaugh has been subdivided into a number of members, the names of which have long been in use. However,

the identity of members of this formation that have been given the same names in far separated areas cannot be established in all localities and the names of subdivision of this formation imply only approximate stratigraphic position. The beds of fossiliferous limestone and shale afford the most valuable key horizons in correlation. The following are some of the members and minor divisions of the Conemaugh formation in the Watershed:

Upper Pittsburgh limestone
Connellsville sandstone
Clarksburg limestone
Ames limestone
Harlem coal
Ewing limestone
"Pittsburgh Reds" and other red shale
Saltsburg sandstone
Bakerstown coal
Cambridge limestone
Buffalo sandstone
Brush Creek limestone
Mahoning sandstone

The Allegheny formation includes the beds that lie between the base of the Brookville coal or of its under clay and the top of the Upper Freeport coal. These limits of the formation are absent or poorly defined. Precise delimitations of the formation in the absence of paleobotanic evidence are impossible. Its average thickness is 250 feet.

This formation underlies the greater part of the study portion of the Watershed and crops out in extensive areas along the flanks of the Negro Mountain Anticline and the Allegheny Front. The position of the outcrops of the formation's most valuable coal beds are shown on drawing 7119-2. It is the chief coal-bearing group in the county, containing the thick and valuable Freeport and Kittanning group of coal beds.

Geographic and Geologic Relations (contd.)

The formation consists of a variable sequence of beds of sand-stone, shale, limestone, clay and coal. The great value of the coal gives the region its chief source of mineral wealth.

The following are the principal members and other divisions of the Allegheny formation in the study area, beginning at the top:

Upper Freeport (E) coal
Upper Freeport limestone
Bolivar clay
Lower Freeport (D) coal
Lower Freeport limestone
Freeport sandstone
Upper Kittanning (C') coal
Johnstown limestone
Middle Kittanning (C) coal
Lower Kittanning (B) coal
Lower Kittanning clay
Kittanning sandstone
Clarion (A') - Brookville (A) coal zone

The Pottsville formation lies above the Mississippian Mauch Chunk formation and is rarely more than 250 feet thick. It has been separated by the Homewood sandstone at the top and the Sharon sandstone forms the base.

The formation is exposed in areas outside the study area along the valley of the Stony Creek but only between the towns of Shanksville and Mostoller within the study area. Although this is a coal bearing series, none of the beds are being mined at present. The Pottsville series is composed of two or more massive sandstone layers which are locally conglomeratic. Between these layers are intervals of shale which sometimes contain two or more impure coal beds. The following members are the principal divisions of the formation:

Homewood sandstone
Mercer coal

Geographic and Geologic Relations (contd.)

Upper Connoquenessing sandstone

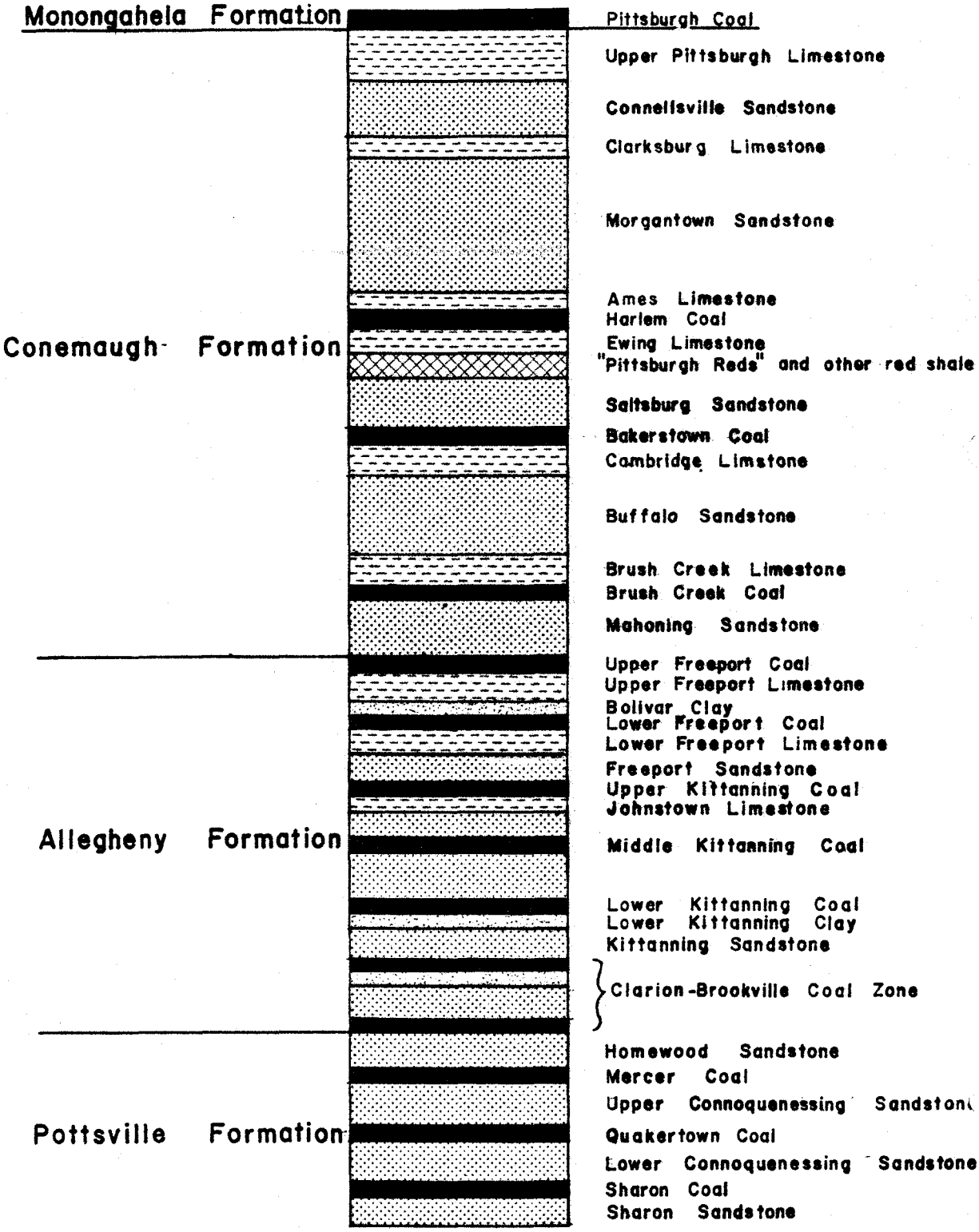
Quakertown coal

Lower Connoquenessing sandstone

Sharon coal

Sharon sandstone

GENERALIZED STRATIGRAPHIC SECTION



Mining History

Somerset County contains one of the largest resources of low volatile coal in the Commonwealth. Early in the 1900's the Upper Kittanning coal became a very important seam that was mined extensively.

It is difficult to determine the date of the earliest mining of the area. The assumption is this activity began in the middle or late 1800's, it being limited almost entirely to the Pittsburgh coal seam in the southern parts of the Watershed and the Lower Kittanning in the north.

There are fourteen (14) coal beds that are of mineable thickness in the Watershed. The Lower and Upper Kittanning, and Upper Freeport are the most important at present. The Lower Freeport and Middle Kittanning are currently being mined in localized areas only.

The coal from this county has been valued highly for generating steam. It is generally soft and friable but withstands transportation better than coals of the same type from other localities.

Due to the vast number of mines in the study area and the lack of mine maps on hand, it is difficult to determine the number of acres that are undermined. However, it is safe to assume that the northern and central portions of the Watershed, along the outcropping on the western flank of the Negro Mountain Anticline, has had the most extensive deep mining.

Serious surface or strip mining activities began between 1940 and 1950 and is yet continuing in large portions of the Watershed. This type of mining activity has been concerning itself with the Upper Freeport and Upper Kittanning coal seams.

The majority of the coal mining within the Watershed was undertaken prior to passage of effective pollution control legislation.

The Commonwealth's first Clean Streams Law, passed in 1937, specifically exempted control of coal mining operations. In 1945, the law was amended to disallow pollution from active mines located on clean streams. Lack of proper funding

delayed effective implementation of this ammendment for several years.

It was not until 1963 that the control of active surface mines was effectively strengthened and not until 1965 that active deep mines were required to control pollution regardless of the quality of the receiving streams. In 1971 the "Surface Mining Conservation and Reclamation Act" was expanded to include not only the surface mining of bituminous and anthracite coal, but also for metallic and nonmetallic minerals. None of the present legislation can require a coal company or operator to undertake any reclamation work or pollution control on mines, both deep and surface, that have been abandoned prior to the enactment of regulatory legislation.

Hydrologic Factors

The annual rainfall of 48 inches insures the water supply to the Watershed which is derived from streams and wells. Springs are numerous, although generally small. They emerge at outcrops of porous beds of sandstone that overlie relatively impervious beds of limestone, clay, or coal.

Water in wells is obtainable, chiefly from the more persistent beds of sandstone, especially from those lying near the surface. Most of the wells yield good supplies, and if they are located toward the axis of synclines the water in many places is under sufficient pressure to flow.

In general, wells less than 100 feet deep are the chief source of water. The water from the shallow wells is generally low in its content of dissolved mineral matter. Salt water, however, was reported in the Pocono formation in the deep wells sunk in search of natural gas, but little or no water was reported in the underlying Catskill beds.

In towns, such as Hooversville, where the chief source of water supply is Stony Creek, the water quality is more sub-standard than communities receiving their water from deep wells. The AMD and mineral deposits that are presently in the main stream, that this and other towns draw from, have been and are presently causing problems to the people of these communities.

When the measures recommended in this report are completed, Hooversville and other towns that depend on Stony Creek for their water supply will enjoy an improved quality of water from which they may draw.

Low rainfall can be expected during the month of October with an average of 5.04 inches. Average runoff for the area is estimated at 30 inches per year. On the average, 106 days per year have precipitation greater than 0.5 inches. The average temperature at Somerset is 47.7°F. There are approximately 150 days per year in which the temperature is less than 32°F, while only 5 days in which the temperature is greater than 90°F.

Hydrologic Factors (contd..)

Present ground water use for Somerset County is broken down as follows:

.9 - million gallons per day - Public Supply

.8 - million gallons per day - Industrial Supply

3.0 - million gallons per day - Rural Use

The Stony Creek is in a low flow area of approximately 0.1 to 0.2 CFS per square mile. This is a measure of flow during dry months of the year and is characteristic of most of Western Pennsylvania. The study area is in a moderate flood zone area with peak flows for a 50 year storm estimated at 11 to 14 thousand CFS per 100 square miles of drainage area (about 15,400 to 19,600 CFS for the Watershed). The study area is considered generally to have a moderate to low silt flow in the stream (not withstanding strip mine silt). Average annual sediment yield is 20 to 250 tons per square mile.

Average Monthly Precipitation
Somerset, Pennsylvania
Main Street Station
77 Years

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept	Oct.	Nov.	Dec.	Ann.
4.15	3.48	4.22	4.40	4.8	5.04	4.62	4.43	3.41	3.01	3.16	3.59	48.31

Demography

Somerset County is rural in development. The county is engaging in a steady growth of manufacturing employment that does not seem to have reached its peak, while employment in mines and quarries has decreased steadily since 1919.

The study area portion of the Stony Creek Watershed is located entirely within a rural area. It encompasses the entire area of Stony Creek Township and portions the following six townships: Brothersvalley, Jenner, Lincoln, Quemehoning, Shade, and Somerset. The population density of the Watershed is estimated to be 69 persons per square mile, with the land area being 1,084 square miles.

Per capita personal income for the county was $1,560 in 1963. This was approximately 35% less than the average per capita personal income for Pennsylvania. Mining accounted for a high 8 percent of the total wages and salaries within the county.

Population Trend 1910-1970
Somerset County

Year	Population	Year	Population
1910	67,717	1950	81,813
1920	82,113	1960	77,450
1930	80,764	1970	74,825
1940	84,957		

Township Population

Area	1960	1970	% Change
Brothersvalley	1,996	2,029	+ 1.63
Jenner	4,615	4,149	-10.10
Lincoln	1,625	1,536	- 5.48
Quemehoning	2,123	2,041	- 3.86
Shade	3,825	3,333	-12.86
Somerset	6,808	7,287	+ 6.57
Stony Creek	1,909	1,778	- 6.86

Demography (contd.)

Employees In Industry

Somerset County

Year	Manufacturing	Mines & Quarries
1919	340	10,868
1930	990	9,587
1940	849	6,515
1951	2,583	5,497
1966	4,205	1,312
1968	4,441	1,320