

## BASIN DESCRIPTION

### LOCATION

Alder Run is situated in Clearfield County, Pennsylvania. The center of the watershed is located seven miles north of Philipsburg and thirteen miles east of Clearfield. The watershed is irregularly shaped with a maximum length of nine miles and a maximum width of five miles. It encompasses 24 square miles, and the main branch of Alder Run flows in a north northeast direction toward the West Branch Susquehanna River .

The named tributaries of Alder Run are Browns Run, Mons Run (sometimes called Hisler Run), Flat Run, Kettle Spring Run and Hubler Run. The watershed includes portions of the Townships of Graham, Morris and Cooper.

### PHYSIOGRAPHY

The watershed lies entirely within the Appalachian Plateaus Province, a wide band of geographically similar terrain extending from New York to Alabama. It is basically a high plateau, extensively dissected by streams. The sedimentary rocks underlying the watershed are mildly folded. The eastern boundary of the Appalachian Plateau lies seven miles to the southeast. The Plateau is separated from the adjacent valley and ridge provinces by a high escarpment called the Allegheny Front.

The watershed area is rolling with relatively flat-topped uplands separated by broadly V-shaped stream valleys. The stream bottom is floored with alluvium, presenting a narrow flat-bottomed appearance. The local relief between the break in slopes at the edge of the rolling uplands and the bottom of adjacent stream valleys is 200 to 300 feet.

Alder Run, like many streams in this area, has a strong coincidence with the numerous northwest-southeast trending faults cutting the area . Where streams and fault direction coincide, the existence of the fault often seems to have influenced the stream channel direction.

## CLIMATOLOGY

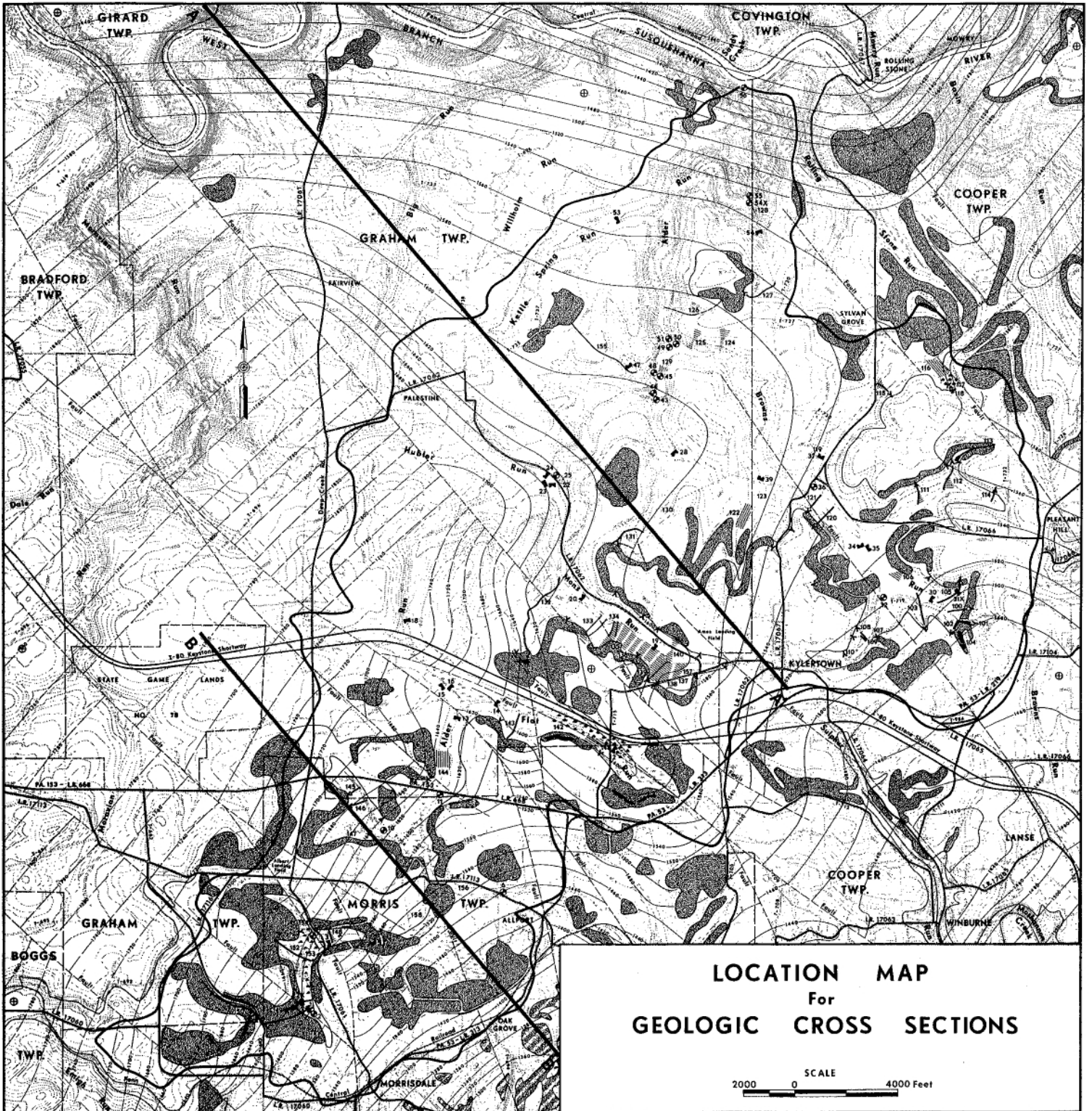
The United States Weather Bureau has a weather station at the Philipsburg or Mid-State Airport, a distance of seven miles southeast from the Alder Run watershed. This area has extremely cold weather for Pennsylvania and above State average snowfall.

During the April 1969 - March 1970 period, temperatures in the area averaged 44.5°F, with 18 days below zero. Temperature extremes ranged from -20°F. to only 90°F.

More than 98 inches of snow fell in the watershed during the 1969-70 winter, as compared to the State 30 year snowfall average of 45.8 inches.

The total precipitation record for May, 1970 was not available at the time of writing this report, so the twelve month period May 1969 to April 1970 has been considered the climatic year of the survey. These records indicate during that period the precipitation was 42.98", compared with a 44.64" average for the area, or 4% below normal. These precipitation records should be considered in the future when comparing magnitude of pollution loads on the watershed. The monthly precipitation on the watershed was as follows:

May, 1969 - 3.91 "	November, 1969 - 4.38"
June, 1969 - 5.92"	December, 1969 - 3.82"
July, 1969 - 6.26"	January, 1970 - 1.06"
August, 1969 - 3.14"	February, 1970 - 3.56"
September, 1969 - 1.82"	March, 1970 - 2.39"
October, 1969- 2.36"	April, 1970- 4.36"

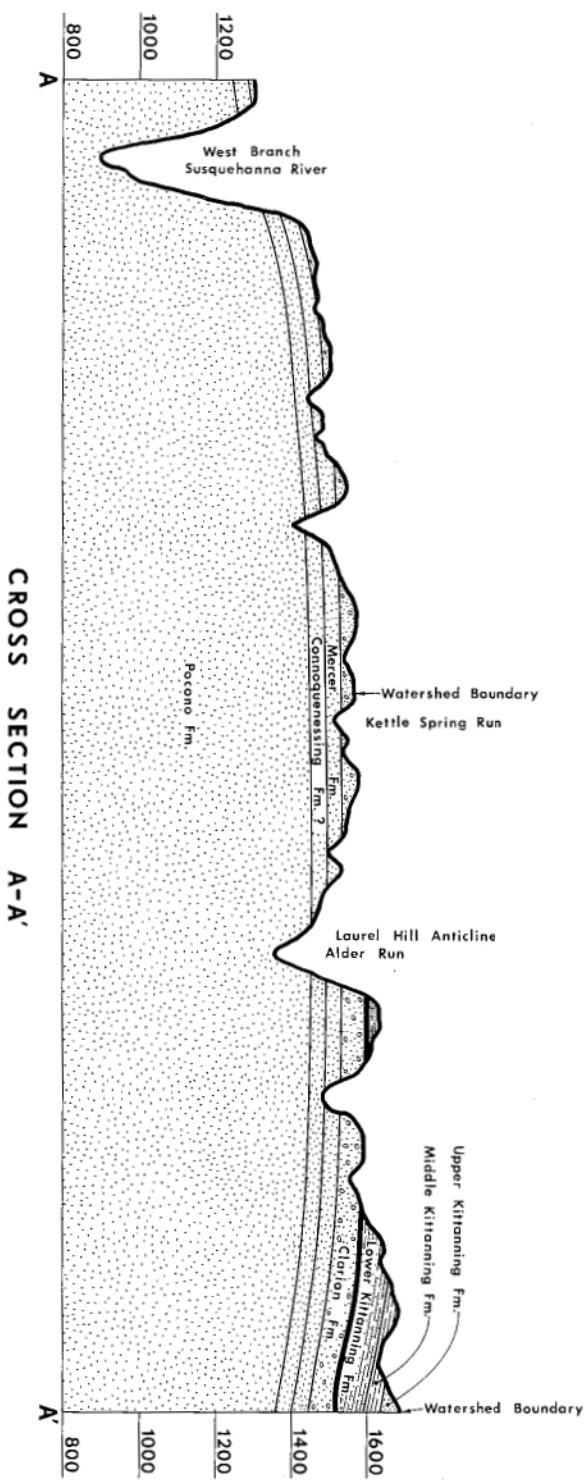
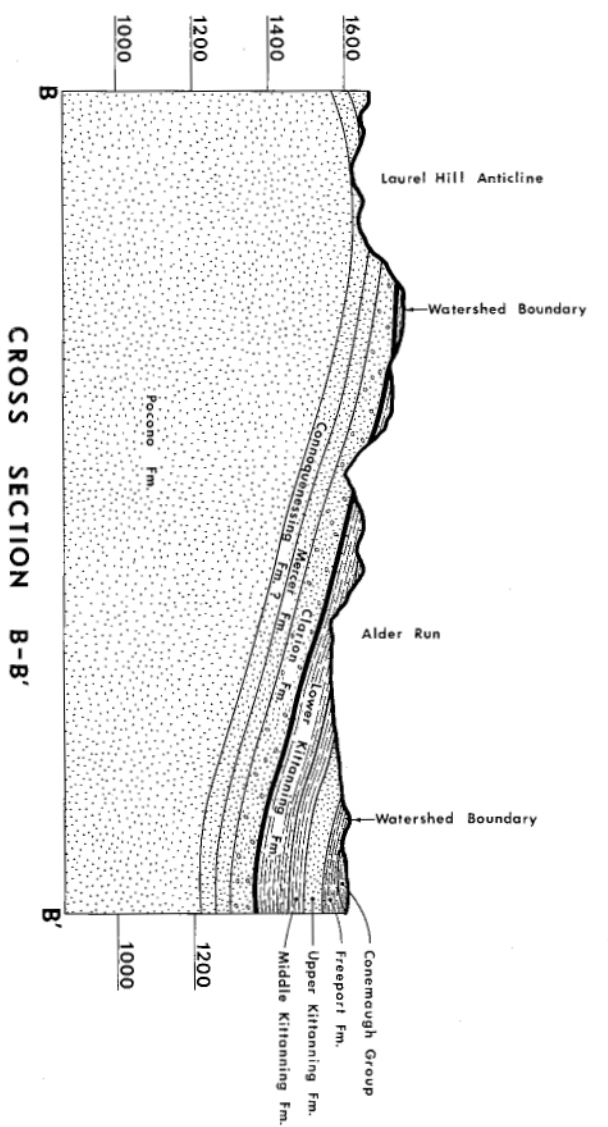


**LOCATION MAP**  
 For  
**GEOLOGIC CROSS SECTIONS**

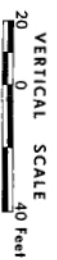
SCALE  
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# GEOLOGIC CROSS SECTIONS



SYSTEM	SERIES	GROUP	FORMATION	COAL MEMBER	SECTION	CHARACTERISTICS OF COAL MEMBER	GENERAL STRATIGRAPHY OF GROUP
Carboniferous	Pennsylvanian	Allegheny	Freeport	Upper Freeport		Discontinuous, locally 2 to 3 feet thick. Strip Mined.	Lower 20 feet of group, containing lenses of claystone and sandstone.
			Upper Kittanning	Upper Kittanning		Discontinuous and split, 1 to 2 feet thick. Strip Mined.	
			Middle Kittanning	Middle Kittanning		Variable and nonpersistent, locally 2 to 3 feet thick. Strip and deep mined.	
		Lower Kittanning	Lower Kittanning		Persistent and well developed 2 to 4 feet thick. Heavily deep mined and stripped.		
		Clarion	Clarion - Brookville		Variable and nonpersistent, locally 2 to 4 feet thick. Strip Mined.		
			Mercer	Mercer	Poorly developed and nonpersistent. Not Mined.		
		Pottsville	Connoquessing 2		Poorly developed cyclic sequence of clay, claystone, sandstone and coal overlying 40 to 60 feet in thickness.		
			Pocono		Fine grained to conglomeratic sandstone up to 500 feet thick.		
		Mississippian					



# STRATIGRAPHIC COLUMN OF SURFACE ROCK

Pennsylvania Geological Survey Bulletin A 85 a & b

## GEOLOGY

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Surface formations in the Alder Run watershed range, vertically, from the upper 500 feet of the Mississippian Pocono Formation to the lower 20 feet of the Pennsylvanian Conemaugh Group, comprising a stratigraphic thickness of nearly 900 feet. Completing this sedimentary sequence are approximately 40 feet of unconsolidated Quaternary alluvium, represented as valley fill.

The Allegheny and Pottsville Groups of the Pennsylvanian series contain the most important formations in the watershed. These are the coal bearers, ranging from the Mercer Formation to the Freeport Formation. They are characterized by erratic cyclic sequences of clay, claystone, shale, siltstone, sandstone, and coal beds. This irregularity manifests itself in the local thickness and lateral continuity of the coal seams, making the Lower Kittanning coal most desirable for mining, followed by the Clarion/Brookville, Middle Kittanning, and Upper Kittanning seams.

This vertical and horizontal variability attests to the area's complex depositional history. The Mississippian strata texturally and lithologically reflect a generally unstable tectonic era. The Pennsylvanian sediments, however, suggest a broad stability range, due to constant changes in base level and rate of subsidence, coupled with an open-water to swampy to continental-fluvial-deltaic environment of deposition. Such an environment of deposition often contains areas of restricted water and oxygen circulation, resulting in a reducing atmosphere. The coal seams and adjacent strata in the watershed reflect this condition by their high sulfur content.

Structurally, the area is controlled by the northeast - striking Laurel Hill Anticlinorium, flanked on the north and south, respectively, by the Clearfield and Houtzdale-Snowslage Synclinoriums. Minor anticlines and synclines occur throughout the area, reflecting the primary deformation by their consistently northeast - striking areas. Disturbing this general trend are a series of wrench faults, increasing in intensity from east to west, with a general northwesterly strike. This tectonic activity has resulted in a reversal of the original attitude of the paleoslope by imposing a variable northwest - southeast dip; however, the general plunge of the larger structures reflect the conditions prior to deformation.

Presently, most of the coal measures are preserved in the Houtzdale-Snowslage Synclinorium, becoming progressively thinner as they approach the Laurel Hill Anticlinorium, and renewing their dominance in the Clearfield Synclinorium. Mining in the Alder Run Watershed has been confined to the southeast limb of the Laurel Hill Anticlinorium. Stripping has occurred on the Clarion/Brookville, Middle and Upper Kittanning seams, while the Lower Kittanning seam has been deep mined and stripped. Most of the mining has occurred above drainage, and due to the thin overburden and presence of highly sulfuritic materials with the coal, acid mine drainage persists.



## MINING HISTORY

Coal mining has been a major factor in the economy of Clearfield County since the turn of the century. Towns in the Alder Run watershed, such as Grassflat, Winburne, Allport and Kylertown, were largely founded on the profits from this industry .

Mining was initially begun in the southern portion of the watershed on those seams comprising the northwest limb of the Houtzdale-Snowslage Synclinorium. The Lower Kittanning or "B" seam was extensively deep mined because of its high quality, persistent mineable thickness, and lateral continuity. Clearfield Bituminous Coal Company; Morrisdale, Maxton and Cunard; Pennsylvania Coal and Coke; and Peale, Peacock, and Kerr were the major operators and established an extensive subterranean system which underlies the southern part of the watershed as well as the regions to the south and east.

These deep mining operations ceased during the period involving World War II and all activity in them since has been concerned with stump pulling and pillar rob-bing methods.

At present, strip mining totally dominates the industry in this watershed, with the bulk of the tonnage coming from the Lower Kittanning seam. Stripping methods have made it economical to remove the isolated deposits associated with the high on the Laurel Hill Anticlinorium. Such procedures have also made it economically feasible to extract the coal from the Middle and Upper Kittanning seams as well as the Clarion/

Brookville and Freeport seams. These latter seams generally vary in quality and thickness and are predictably unreliable laterally.

## REGULATION OF MINING TO PREVENT POLLUTION

The vast majority of the mining on Alder Run was undertaken prior to passage of effective pollution control legislation.

The Commonwealth's first clean streams law, passed in 1937, specifically exempted control of 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 amendment by several years. By that time, Alder Run was not considered a "clean stream" so mining was allowed essentially without restriction. The technical requirements developed under this law were also weak (complete strip mine restoration and effective mine sealing were seldom required).

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. None of the present conservation laws can require a coal company to undertake any reclamation work or pollution abatement on mines operated and completed prior to enactment of regulatory legislation. At the present time, surface land or mineral rights owners from whose properties pollution emanates cannot be held liable for abatement of the pollution. Accordingly, the abatement of pollution on Alder Run has become a liability of the public.