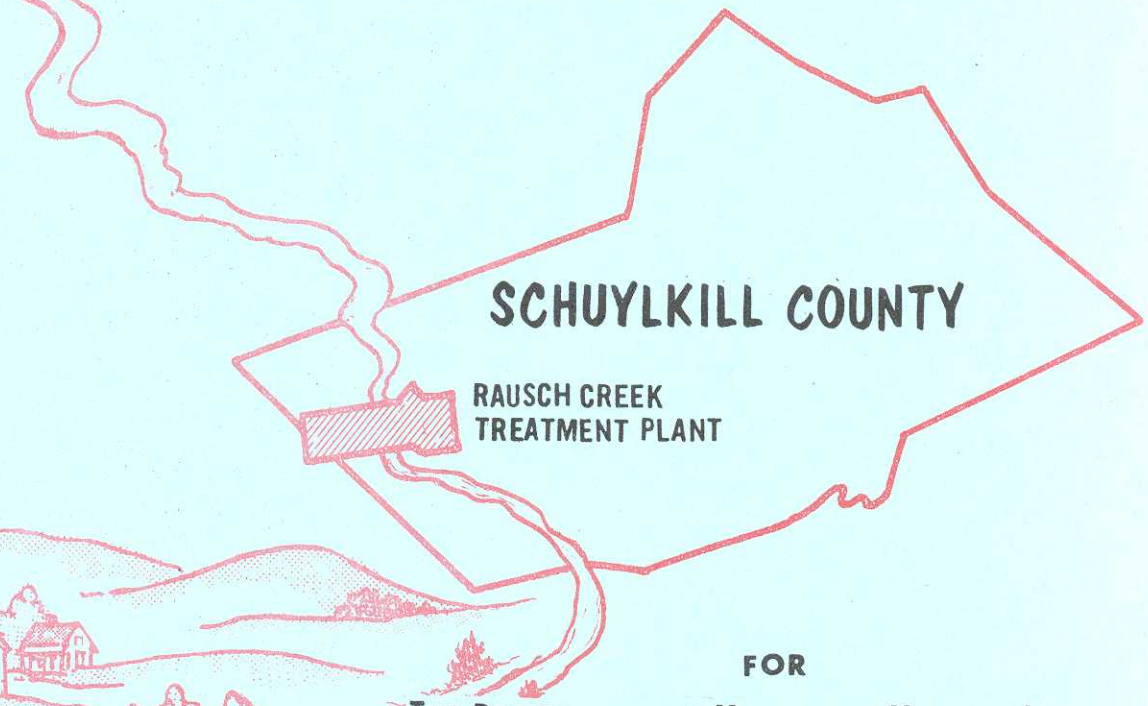
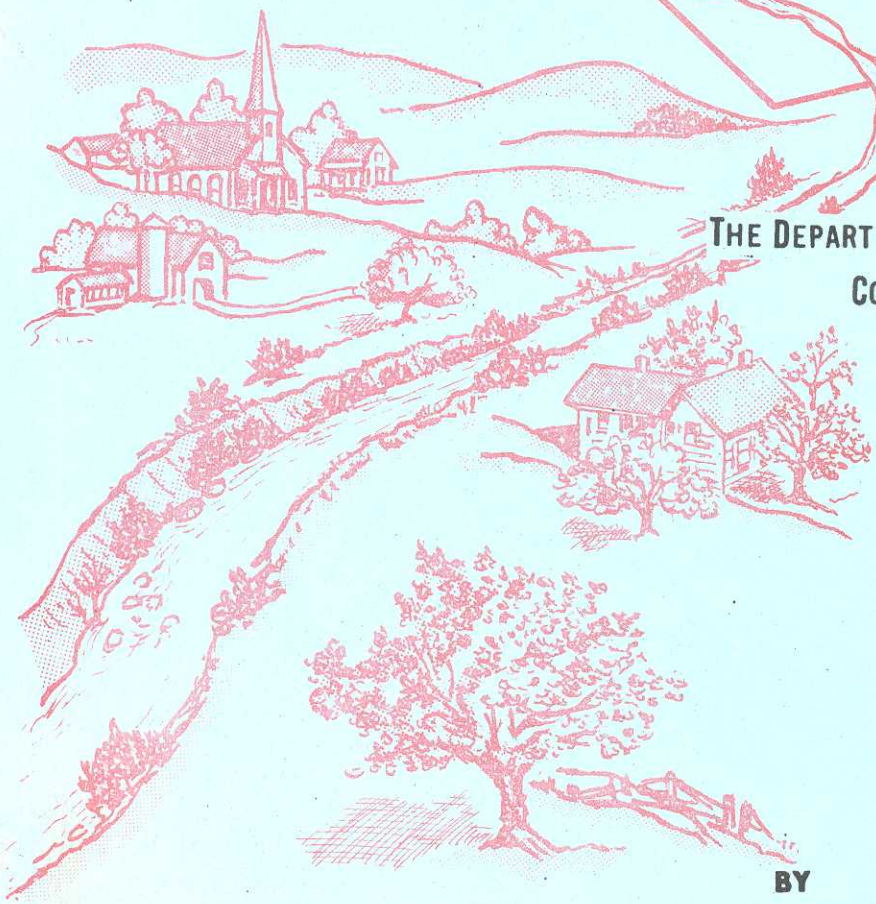
THE RAUSCH CREEK WATER SHED

PROJECT NO. SL 112
SCHUYLKILL COUNTY



FOR

THE DEPARTMENT OF MINES AND MINERAL INDUSTRIES
COMMONWEALTH OF PENNSYLVANIA



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INTRODUCTIOU

Stream pollution by acid mine water has been the subject of considerable concern and study both by the mining industry and Government agencies for the past fifty (50) years.

Water pollution resulting from acid mine drainage in the anthracite region is similar in character to that in the region affected by the bituminous - coal mines.

The chemical pollutants in acid mine water, including sulfuric acid and the acid salts of iron and other metals, are toxic to aquatic life. They destroy or reduce the natural alkalinity of streams, resulting in a permanent sulfate hardness both difficult and expensive to remove at water-treatment plants. The presence of dissolved salts of iron and manganese imparts undesirable properties for many water users. As with other pollutants, the detrimental effects of mine-drainage pollution grow in importance with the water needs of the expanding population, especially in urban centers. Future needs for suitable domestic and industrial water must be met from various surface water sources; the ground water supply will be inadequate.

Acid is formed in coal mines from the pyritic material in coal, gob, and associated rock, and in coal-refuse storage when the pyrite contained in these various materials is exposed to the oxygen and moisture of the atmosphere. When the sulfuric acid and the acid salts of iron, formed from the pyrite, are dissolved by surface or ground water and carried to an adjacent watercourse, they become acid mine drainage and pollutants of connecting streams. Secondary reactions between sulfuric acid and the acid salts or iron, inorganic minerals, and organic materials in the mines, in coal storage and coal refuse piles, and in the streams, produce other chemicals often found with acid mine drainage.

The Department of Mines & Mineral Industries of Pennsylvania authorized engineering surveys of a number of major watersheds in the Commonwealth. The purpose of these surveys was to locate the sources of pollution stemming from abandoned deep and strip mines, to recommend measures of correction, and to estimate the costs of abatement.

One of the major watersheds recommended for study was the Rausch Creek Watershed, located in the western section of Schuylkill County, near the Dauphin County line. In August, 1968, the Rausch Creek Watershed

Pollution Survey was instituted to recommend pollution abatement measures needed, to determine costs, and to design a treatment plant for active and abandoned mine discharges.

DESCRIPTION OF THE RAUSCH CREEK WATERSHED

This watershed, as designed for-study, is found in the western part of Schuylkill County. It includes parts of both Hegins and Porter Townships and extends slightly into neighboring Williams Township in Dauphin County. The Watershed is bounded on the North by Bear Mountain, which is bisected at the Gap in which Rausch Creek flows in a northerly direction towards its confluence with Pine Creek. The southern boundary is Big Lick Mountain. Two branches of Rausch Creek, the West Branch and the East Branch, flow through the valley between the two mountains. The area of the watershed constitutes approximately 6,300 acres.

The area described in this report lies within the Appalachian Valley and Ridge province, a subdivision of the Appalachian Highlands. Geologically this is a region of alternating hard and soft sedimentary rocks, which have been bent by lateral compression from the southeast into folds or waves - anticlines (arches) and

synclines (troughs). After the rocks had been folded the entire area was slowly baseleveled (peneplained) by erosion, and hard and soft layers alike were finally reduced to a nearly uniform surface (peneplain). Then a general uplift of the region gave the streams renewed vigor and began another cycle of erosion, which is still operating at the present time. During this last cycle of erosion the softer rocks have been gradually worn down and carried away and the more resistant rocks stand out as ridges. The effect of the pitch of the folds has had a marked influence on the present-day topography and has resulted in a series of canoe-shaped synclinal valleys in which are located the principal anthracite fields.

The rock formations in the area are all of sedimentary origin, and range in age from the post-Pottsville formations of Pennsylvania age, down to the Tuscarora sandstone. The youngest formations, the post-Pottsville, comprising the Allegheny formation and part of the Conemaugh formation, crop out in the large Southern Anthracite field and part of the Western Middle field. The oldest formation, the Tuscarora, crops out along Kittatinny (Blue) Mountain, which forms the southern boundary of the county.

The geologic structure is complex. The strata have been sharply folded along northeast axes, and the truncated hard and soft beds now form an intricate system of long, narrow ridges and valleys.

The post-Pottsville formations, including the Allegheny and the Conemaugh, attain their greatest thickness in the anthracite region in the Southern anthracite field where they are more than 2,500 feet thick. They contain about 20 different workable coal beds and numerous thin seams of coal. The post-Pottsville formations contain numerous beds of conglomerate, sandstone, slate, and coal, which, owing to severe folding and crushing, contain innumerable fractures that transmit water readily. The depth of mine workings averages between 1,300 feet and 1,800 feet so that in the vicinity of the coal mines the strata are drained to great depths by pumping.

The removal and processing of anthracite coal causes many changes in the hydrology of the basin. Stream-flow is affected by diversions and consumptive use of water for the processing of the coal. Ground-water flow is altered by artificial drainage in mines and stripping pits. The character of the water is altered by introduction of silt and soluble materials. Water from anthracite coal mines

and preparation plants is acidic, culm laden and highly mineralized. Changes in land cover, caused by stripping operations, modifies the hydrology of the basin more than any other factor. The amount of water consumed by the land increases or decreases and affects the runoff reaching the streams. When the cover is removed, the runoff increases and makes possible increased erosion of the soil cover in adjacent areas. Concentration of mining activities requires diversions of flow to satisfy man's needs.

DRAINAGE

The West Branch of Rausch Creek has its origin in a swampy area approximately 3.3 miles west of its junction with the East Branch of Rausch Creek. It flows easterly through the valley in a haphazard manner to its junction with the East Branch.

The East Branch of Rausch Creek originates in the large stripping area on the north slope of Big Lick Mountain in the southeastern area of the watershed and flows in a westerly direction through the valley.

Both branches are fed by surface springs and mine discharges from active and abandoned workings.

At the confluence of the two branches, the flow of Rausch Creek then becomes northerly through the gap in Bear Mountain towards its confluence with Pine Creek, approximately 1.6 miles distant.

LAND USE

The land use in the Rausch Creek Watershed area is strictly related to coal mining and coal processing operations.

The mining operations in the Watershed Area produce an average of approximately one-half million (500,000) tons of high-grade anthracite coal annually. The underground presence of about twenty (20) different workable coal beds and numerous thin seams of coal in the Watershed Area is the explanation for its being an extensive mining area.

The two (2) principal coal processing operations in the Watershed Area are:

1) the Legal Coal Company Breaker - located near the confluence of the East and West Branches of Rausch Creek, and
2) the Leon Kocher Coal Company Breaker located on the East Branch of Rausch Creek, approximately four thousand (4,000) feet east of the Gap in Bear Mountain.

There are no domestic or industrial facilities located within the Watershed Area.

The Watershed Area, because of its topography, is not conducive to agriculture.

In its present state, the only value of the land within the Watershed Area would be that of a recreational one, hunting. This has its encumbrances in that the imminent dangers of the mining operations, i.e., deep mines, stripping operations, both active and abandoned, "crop falls", and associated mining features do not contribute to making the area an attractive one for hunting or other forms of recreation.

The only potential use the area could have been subjected to, prior to the advent of mining operations, would have been one of a reservoir for municipal water supply. The topography at certain locations would have been "natural" for this purpose.

METHOD OF STUDY

A field study was instituted in order to locate and identify all pollution sources within the study area.

Once the pollution sources were located and identified, a program was initiated to do periodic measurements and chemical analyses of the same. Where

necessary, weir measuring stations were erected to record flows, and other pump-metering stations were installed to record the same. Once this was accomplished, the sample collection program was instituted along with the measurement program.

Water samples were analyzed for the following:

a) pH

b) acidity

c) iron

d) sulfates

Along with the aforementioned studies, other fields of investigation were pursued. Deep mines maps were obtained, where possible, for the watershed area and a geologic and engineering-study was made to determine the over-all sub-surface drainage trends of the watershed area.

Aerial photographs of the watershed area were also utilized in the study for locations of both deep mines and strip mines and pits, as well as the effects these features had upon surface drainage.

Three (3) concepts of water treatment studied were:

Scheme "A"

Source Treatment

Individual plants to be built and operated by the individual operators.

Scheme "B"

Strategically located plants

Plants built on each branch of Rausch Creek at selected sites.

Scheme "C"

A Universal Plant

One plant to be located immediately north of all sources of pollution.

INFORMATION SOURCES

Data for this report was obtained from the following various sources:

a) The Pennsylvania Department of Mines and Mineral Industries
b) The Pennsylvania Department of Health
c) The Federal Water Pollution Control Authority
d) The United States Bureau of Mines
e) The United States Geological Survey
f) The local Coal Industry - Owners, Operators, etc.
(too many in number to enumerate)