Hard Coal:

The Anthracite Story

by Chuck Yungkurth

PHOTO BY JOHN KRAUSE; LEHIGH COAL & NAVIGATION CO.

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Coal was formed in Pennsylvania when a series of coastal swamps were created as rising ocean water flooded heavily vegetated land areas. Later, the sea receded and the swamps were covered by layers of mud, sand, and skeletal matter from ocean organisms. This happened many times, eventually forming layers of coal interspersed between bands of rock, limestone, and shale. Later periods of intense geological activity caused upheavals of the earth's crust, resulting in ridges of mountains across the state. The mountain-building forces in the western and central parts of the state were less intense, resulting in gradual undulations in the originally-horizontal land surface and coal seams. The action of water and rivers eventually cut steep-sided valleys into the relatively flat area, creating the present-day countryside of many valleys and ridges. In this area, the river valleys frequently cut through the seams of coal and mining consisted of merely tunneling into a hillside where an outcropping occurred.

The eastern part of Pennsylvania was subjected to much more intense pressures, which led to folding, cracking, and upheaving the deposited layers of coal and other minerals. In some places, the veins of coal intersected the surface at an angle, then plunging steeply into a basin, they would come to the surface at the other edge of the valley or basin. The additional geological activity subjected the coal to additional pressures, and possibly more heat, which made the coal denser and less gaseous. Coal which received the additional pressure is called anthracite coal, while the undisturbed coal is called bituminous. These classifications are not precise, as there are many classifications of coal between bituminous and anthracite, depending on where they are mined and the characteristics of the coal. It is said that there

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When these photos were taken, in February, 1969, coal was still being mined in Carbondale, Pennsylvania, and taken to the Northwest breaker. The breaker was located on what was originally the Scranton Division of the O&W and later operated by the Erie Lackawanna as their Riverside branch. The blue paint on the side of the breaker (**below**) is from the spraying of the coal loads, which was being done at that time as a means of insuring that none of the coal was removed from the hoppers before they reached their destination.

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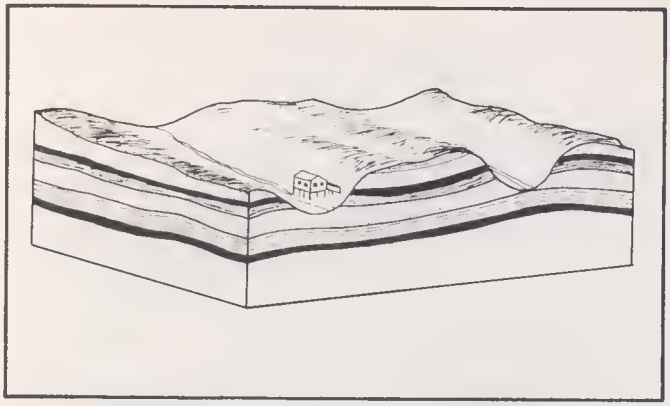
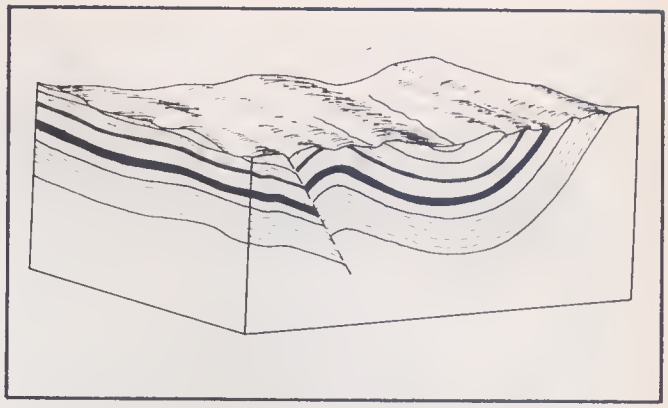


DRAWINGS BY CHUCK YUNGKURTH

The bituminous coal seams of western Pennsylvania run parallel to the surface of the earth and the valleys have been formed by years of water erosion.



The anthracite coal seams of eastern Pennsylvania have been broken and the valleys, ridges, and basins have been formed by upheavals of the Earth's crust.

was a mine in Sullivan County, Pennsylvania, which mined bituminous coal on the upper seams, while anthracite could be mined at lower levels.

For many years anthracite coal was a major energy source in the northeastern United States. It was used primarily for the heating of homes and other buildings, but a large amount was used in power stations for generating electricity. Until the mid-thirties, anthracite was used for locomotive fuel by the railroads of the region; after that it was cheaper to bring in bituminous coal for this purpose. The Wooten locomotive firebox was developed by the Reading Coal and Iron Company to burn the small sizes of coal for which there was no market in the late nineteenth century. This wide firebox led, in turn, to the development of the two-cab Mother Hubbard locomotive. These distinctive steam locomotives were an integral part of the anthracite mining scene and were universally known throughout the region as "camelbacks."

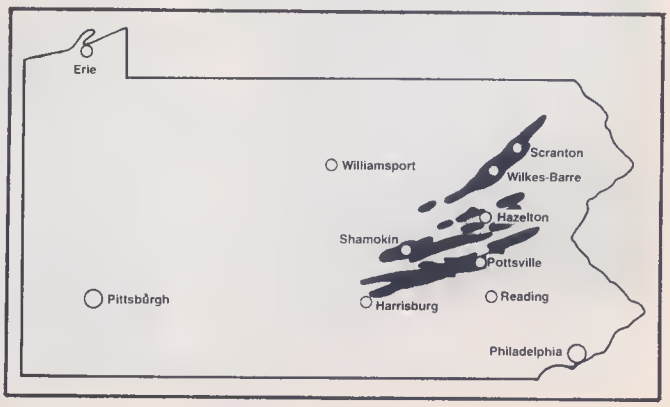
The transportation of anthracite was the reason for constructing the railroads which ultimately were joined to form the Reading, Lackawanna, Delaware & Hudson, Lehigh Valley and others which served northeastern Pennsylvania. Most of these lines were intended to haul the anthracite to urban centers, as well as to ocean and lake ports. When the coal trade declined, railroads such as the Lackawanna and the Lehigh Valley attempted to become east-west carriers to replace the lost traffic. The eventual demise of these railroads can be traced to their routes through the rugged, mountainous country which they traversed because that is where the coal was.

One of the major problems faced by the early anthracite railroads was the constant flow of coal needed to operate the lines efficiently. This was a difficulty, even to those companies such as the Reading and the D&H, which were originally coal companies that got into the canal business, and later railroading, just to get the coal to a marketplace. To assure adequate coal supply and traffic, the railroads began to buy up coal lands and mining companies until they controled the entire industry. Despite this dominance, there were certain problems which plagued the mining and shipping of anthracite. The demand for the coal existed only in the winter months, and there was no really efficient or economical way to store large quantities of it. Throughout the entire anthracite era in Pennsylvania, the problems of supply and demand led to slack periods where mines were closed, miners were laid off, and the railroads had yards crammed full of empty hopper cars for long periods. When the coal market rose, the mines could not be worked fast enough and the railroads did not have enough equipment to handle the flow. These factors led to constant union problems, including the famous "Molly Maguires," which were bands of militant miners. The hardships affecting the industry were often expressed in burned breakers, blacklists and other confrontations between the companies and the men.

As part of the mine-to-market organizations owned by the railroads, networks of distributors and coal yards for home sales and deliveries were set up. In 1906, federal legislation, in the form of the Hepburn Act, prohibited all railroads from transporting commodities produced by the railroads themselves, with the exception of timber. The effect of this legislation was a long series of court battles which ultimately forced the railroads to set up separate companies to mine and market their coal holdings. The D&H formed the Hudson Coal Company; the Lackawanna created the Glen Alden Coal Company; and the Lehigh Valley Coal Company mines were, of course, formerly owned by the Lehigh Valley Railroad. Virtually every coal carrier had a corresponding mining and sales company, and all these coal companies carried out very competitive advertising campaigns with distinctive trade marks.

Perhaps the best known of these advertising promotions was the "Blue Coal" sold by the Glen Alden Coal Company. This coal company sponsored the famous *Adventures of the Shadow* radio mystery series for many years. The name Blue Coal came from the blue flame given off by the burning anthracite, but to do it up really proper, the Glen Alden actu-

This map of Pennsylvania shows the anthracite regions: Scranton to Wilkes-Barre; Shamokin to Hazelton; and the Pottsville area.



ally dyed the coal blue! The dye was dissolved in water, along with a powder, and was sprayed on the coal as it was loaded into the hopper cars at the breaker or preparation plant. (So trains of bright coal are quite prototypical for the period through the forties!) Not to be outdone by such an advertising coup, the Hudson Coal Company sold their anthracite with small orange tagboard triangles scattered through it to identify their "D&H Cone Cleaned Coal." Another coal company sold anthracite covered with small red dots. World War II put an end to this gimmickery—there is no telling where it all would have ended.

The metal signs bearing the trademarks, dealers names, and slogans of the large anthracite coal companies are still to be seen an old coal bunkers near fuel dealers' yards all over the Northeast. Glen Alden signs are very common in upstate New York, while the familiar "fried egg" of the Lehigh and New England's "Old Company's Lehigh" is seen in Pennsylvania and New Jersey.

The dependence upon the home heating market made the anthracite mines especially vulnerable to the spreading oil and natural gas industry for domestic use. Despite the introduction of stokers for automatically firing home furnaces, the nuisance of disposing of ashes, plus providing coal storage space in houses remained. Smaller new homes had no basements for furnaces and coal bins. By 1950, the anthracite industry was in really bad shape. The slump started before World War II. Higher labor costs, obsolete equipment, mine flooding, and the fact that the better veins were mined out, all helped contribute to the general decline.

Hauling anthracite was still an important part of railroad traffic until well into the early diesel era. A fair number of large mines and processing facilities were operating on a partial basis as late as 1965. Even now, Conrail lists over thirty points where anthracite is loaded, all in the area bounded by the Lehigh and the Susquehanna rivers on the east and west, and approximately Harrisburg on the south, with Wilkes-Barre on the north. While much of the coal today is used in power plants as a fuel, much of it is also used for chemical processes and as a filter material. The black gravel in the filter of your home aquarium apparatus is probably anthracite coal.

In appearance, bituminous coal is a grayish black, crumbly mineral. If a large piece is dropped, it will usually shatter into smaller fragments and dust. Typically, it is made up of about 60% pure carbon, with the rest being volatile material that burns as a gas after the coal is heated. Most of the volatile material is hydrogen which combines with the sulfur often found in "soft" coal to form hydrogen sulfide gas. This in turn gives the characteristic steam locomotive smoke odor. Bituminous coal burns with a bright yellow flame and can give off considerable amounts of smoke, depending on the exact composition of the coal and the conditions under which it is being burned. This type of coal is found in many parts of the United States and, when coal is used in a general term, it refers to bituminous coal. Depending again on the exact type of soft coal, it can be converted into coke by heating it in a sealed chamber and driving off the gases, leaving pure carbon, or coke, behind.

The famous "Fried Egg" insignia of Old Company's Lehigh adorns the entrance to the mine shaft at Lansford, Pennsylvania.

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One of the very few anthracite breakers served by an interurban was located on the Lackawanna & Wyoming Valley Railroad's Laurel Line near Moosic, Pennsylvania. This crude wooden structure was typical of the smallest mining operations and only loaded a few cars a day. Electric current for the rail serving the siding was controlled by a knife switch located in the box on the power pole.

Anthracite is a hard glassy material which requires considerable force or a hard blow to cause a fracture. It is made up almost entirely of pure carbon which burns cleanly and leaves very little ash. The burning produces little smoke or smell, which made it ideal for home heating. Northeastern Pennsylvania is the only place in the world where anthracite coal is found in significant commercial quantities. There are some small deposits in Rhode Island, and a fair amount was hauled out of the Rockies in Colorado by the narrow gauge network of the Denver and Rio Grande.

The coal mines as modeled on the typical model railroad represent soft coal tipples. Actually we don't model coal mines, since the mines are under the surface of the earth, unless it is an open pit or strip mine. What is modeled is either a loading facility or a preparation plant. The soft coal tipple is literally that. Since bituminous coal occurs in thick seams with little rock or shale, only the coal is removed. It is brought out and, after a very cursory screening and hand picking to remove stray scrap iron, rock, and unexploded blasting material, it is dumped directly into the waiting hopper cars. Operations of this sort can still be found today in soft coal areas, but the output of the mines is usually forwarded to a large modern processing plant where it is carefully graded and cleaned for today's complex soft coal market.

From the very start of the anthracite mining industry, it was necessary to resort to extensive crushing, screening, and separation of the accompanying rock and slate that was

The giant Saint Nicholas breaker in Minersville, Pennsylvania, which was built in 1967, stands in sharp contrast to the little wooden breaker pictured above, and the row of wooden company houses that line the street leading up to it.

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removed from the mine along with the coal. The market for hard coal always demanded that the coal be sized for the type of furnace or grates upon which it was to be burned. Coal was graded into sizes starting with "egg," then down through "chestnut" and "pea," with other intermediate grades, until the finest sizes, such as "rice," were reached. These processes were carried out in tall structures called "breakers" by the natives, but officially called "collieries" by the coal companies. The breakers had a distinctive feature in that there was always a long sloping ramp to haul the coal to the top of the building; from there, it passed by gravity through the processing machinery until it arrived in the standard gauge hopper cars at ground level. Early coal breakers actually had mine car trackage on the slope to the top, and mine cars were hauled up by cables and hoisting machinery. As technology progressed, the mine cars were unloaded at ground level and the coal moved to the top of the breaker by various types of conveyors. This eliminated the problems associated with locating the car hoisting and dumping machinery at the top of a structure already crammed with crushers and other apparatus. The first breakers were of massive wood construction. Difficulties with fire, machinery vibrations and decay caused by the constant flow of water associated with coal cleaning led to the construction of steel-framed buildings sheathed with corrugated iron. Such construction began in the early part of this century in Pennsylvania.

One of the largest anthracite breakers still standing today is the Loree Colliery at Larksville, Pennsylvania. It was built in 139 days after a fire destroyed an older wooden breaker in 1919. Constructed and operated by the Hudson Coal Company, it had a capacity of over 100 fifty-ton cars per day. While no longer served by rail, the equipment is still used to process coal trucked into and out of the breaker. A few breakers were built after World War II, with the St. Nicholas plant at Minersville being one of the most modern. Completed in 1967, it is part of the Reading Anthracite Company's workings, which are located throughout the southern part of the anthracite region.

Mining operations were carried out wherever the coal could be mined. Collieries and mine entrances were found in the center of large cities, as well in remote rural regions. The cities and towns developed around the mining, with the railroads and mine machinery manufacturing plants coming later. Both Scranton and Wilkes-Barre had mine entrances, large breakers and large waste heaps just several city blocks from the main business thoroughfares. Miners in these cities were able to ride streetcars to work and alight directly at the breakers. Residential areas of various types were adjacent to the mines, particularly in the more remote areas, where the famous "patch" of company-built small houses was a part of every mine company's property. Railroad yards and locomotive servicing facilities were frequently built right next to large breakers, because larger numbers of trains and crews worked from these points. All of this adds up to the fact that an anthracite breaker can be located virtually anywhere on a model railroad that has an eastern Pennsylvania theme, with all kinds of interesting scenic and operating possibilities. We will take a look at ways to model them next month.

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Towns and rail yards often grew up around the mining operations. The CNJ's Ashley yard is a prime example of this (**above**). The view of Swoyersville (**below**) shows the former "Harry E" breaker looming above the houses and a local watering spot. The backyards of these houses end at the railroad tracks serving the breaker.

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R. STAFFORD COLLECTION

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In this Reading Anthracite Company photo, a Reading Railroad 2-8-8-0 with a coal train poses in front of the newly constructed Locust Summit breaker (**left**). Today, the abandoned breaker stands as a monument to the days when coal was king.