

ORBES

PENNSYLVANIA BASELINE

Part 1 - General Information

Section 1 - Nature of the ORBES Project

Section 2 - The Pennsylvania Baseline

Section 3 - Historical Synopsis of
Human Activities in
Western Pennsylvania

PHASE II

OHIO RIVER BASIN ENERGY STUDY

June, 1979

PENNSYLVANIA BASELINE

Part 1 - General Information

Section 1 - Nature of the ORBES Project

Section 2 - The Pennsylvania Baseline

Section 3 - Historical Synoosis of
Human Activities in
Western Pennsylvania

BY

Maurice A. Shapiro
University of Pittsburgh
Pittsburgh, Pennsylvania 15261

Prepared for
Ohio River Basin Energy Study (ORBES)

Grant Number R305603-01-3

OFFICE OF RESEARCH AND DEVELOPMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

1.1 NATURE OF THE ORBES PROJECT

The Ohio River Basin Energy Study (ORBES) is an integrated technology assessment funded by the U.S. Environmental Protection Agency. This interdisciplinary endeavor is currently in its third year of research (Phase II). The objective of the project is to ascertain plausible environmental, economic, and sociological impacts of energy development in the Ohio River Basin under six hypothetical energy scenarios (futures). The ORBES study region includes part or all of the six states bordering the river: substantial portions of Illinois, Indiana, and Ohio (excluding the northern tier counties), all of Kentucky, southwestern Pennsylvania, and most of West Virginia (Figure 1). Academicians from the University of Illinois, University of Kentucky, University of Louisville, Indiana University, Ohio State University, Purdue University, West Virginia University, and the University of Pittsburgh provide technical expertise in the fields of ecology, economics, engineering, geography, health, law, sociology, planning, and political science.

1.2 THE PENNSYLVANIA BASELINE

Early in the project, environmental/socio-economic "baselines" of each state were deemed to be requisite input in order to establish a solid foundation from which to conduct energy impact analyses. A baseline consists of a series of in-depth documents which describe the existing resources and environmental status of a state's ORBES region and at the same time provide a historical overview of changes in these resources. The resulting characterization provides a perspective - it presents

FIGURE 1
OHIO RIVER BASIN ENERGY STUDY REGION
PHASE II



..... Ohio River Drainage Basin

the data necessary to gauge the magnitude and significance of future impacts. The Pennsylvania baseline is comprised of six documents (Table 1) which contain the most current and pertinent information available for eight topical areas generally addressed in environmental impacts statements: geology, climatology, soils, terrestrial ecology, hydrology, water quality, aquatic ecology, and socio-economics. Data analysis and interpretation by the seven contributing authors (Table 2) makes these documents a valuable source of information for both the ORBES Project and agencies concerned with the management of Western Pennsylvania's resources.

The Pennsylvania ORBES region encompasses 13,300 square miles of Western Pennsylvania. The region contains all of the following nineteen counties: Allegheny, Armstrong, Beaver, Butler, Cambria, Clearfield, Clarion, Elk, Fayette, Forest, Greene, Indiana, Jefferson, Lawrence, Mercer, Somerset, Venango, Washington, and Westmoreland. Figure 2 illustrates the location of these counties in Western Pennsylvania. The county abbreviations employed in Figure 2 are also utilized in many of the tables within the baseline documents. A comparison of Figure 2 with a map of the Ohio River drainage in Pennsylvania (Figure 1) reveals that several counties within the basin (Crawford, Erie, McKean, Potter, and Warren) were excluded from the study region. Conversely, Clearfield County is included in the study region even though only 9.9% of its land area is drained to the Ohio River System. Selection of counties for inclusion in ORBES was the result of deliberation by the Core Team, taking into account

TABLE 1
TOPICAL AREAS OF BASELINE
FOR THE PENNSYLVANIA ORBS REGION

Part II - Impact Assessment Data Base

Chapter 1 - Characteristics and Human Utilization of Natural Ecosystems

Section 1 - Geology

Section 2 - Climatology

Section 3 - Soils

Section 4 - Terrestrial Ecology

Section 5 - Surface Hydrology

Section 6 - Water Quality

Section 7 - Aquatic Ecology

Chapter 2 - Socio-Economic Characteristics

Section 1 - Demographic Characteristics

Section 2 - Income

Section 3 - Employment

Section 4 - Housing

Section 5 - Governmental Revenues and Expenditures

Section 6 - Public and Personal Services

Section 7 - Agriculture and Natural Resources

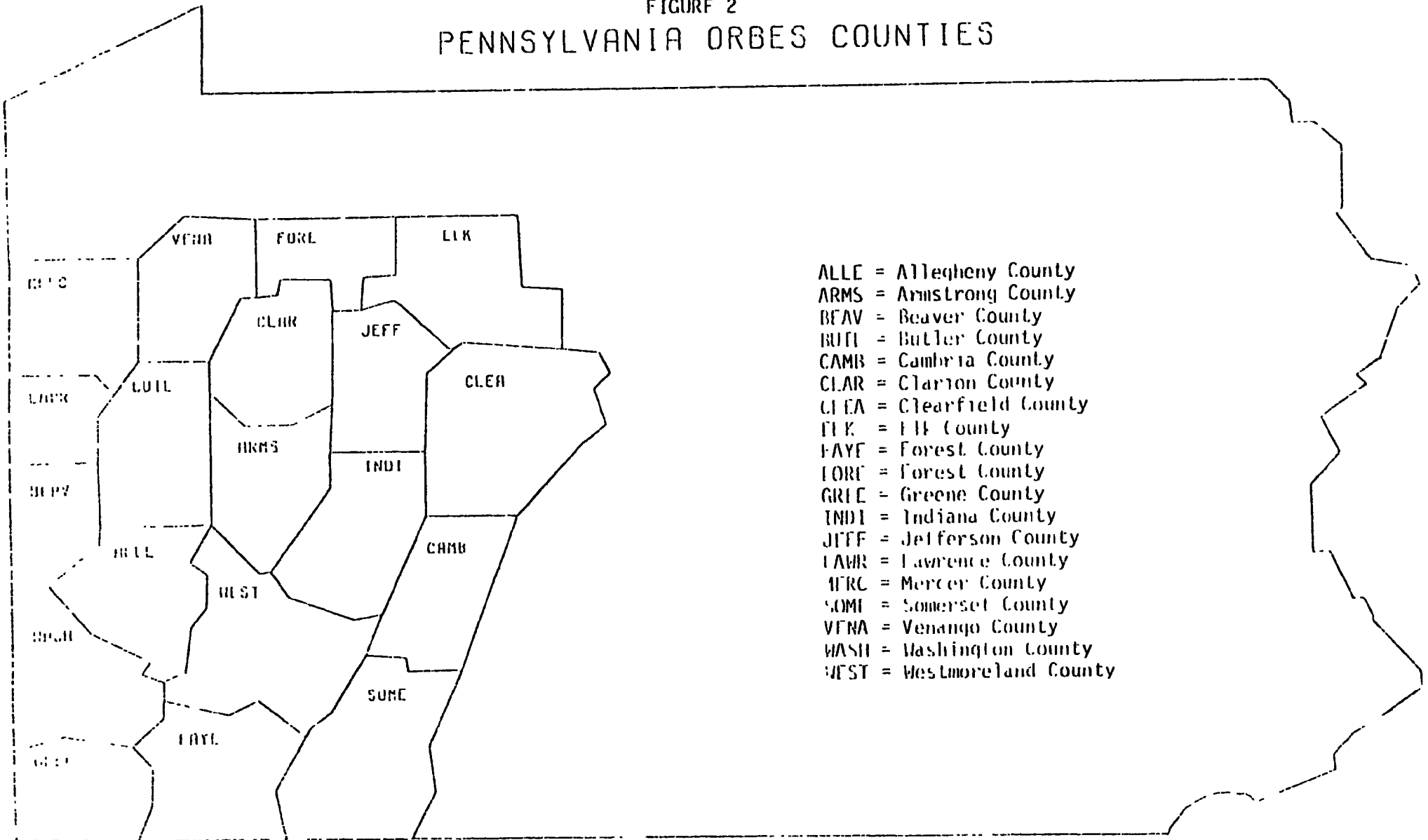
Section 8 - Summary of Socio-Economic Characteristics

TABLE 2

UNIVERSITY OF PITTSBURGH RESEARCH TEAM
OHIO RIVER BASIN ENERGY STUDY'S
PENNSYLVANIA BASELINE

Burgess, Richard A. Graduate Student Researcher Dept. IEHS	Socio-Economics
Flint, Norman K. Professor of Geology Dept. Geology	Geology, Climatology, and Soils
Kay, George P. Environmental Research Asst. Dept. IEHS	Hydrology, Aquatic and Terrestrial Ecology
Shapiro, Maurice A. Professor Environ. Health Engineering Dept. IEHS	Project Director, Socio-Economics, Hydrology and Ecology
Sharma, Rabinder K. Asst. Professor Public Health Dept. HSA	Socio-Economics
Sooky, Attila A. Assoc. Research Professor - Water Poll. Cntrl. Dept. IEHS	Water Quality and Hydrology
Sykora, Jan L. Assoc. Research Professor - Aquatic Biol. Dept. IEHS	Aquatic and Terrestrial Ecology

FIGURE 2
PENNSYLVANIA ORBES COUNTIES



such factors as the potentiality for power plant construction in the area, relative hydrologic importance of the area, and importance of cities outside the basin to the county's economy. In Pennsylvania's case northern counties of the basin were eliminated from consideration because of the low potentiality for future power plants and because of economic influence from Erie, Pennsylvania, and upstate New York.

1.3 A HISTORICAL SYNOPSIS OF HUMAN ACTIVITIES IN WESTERN PENNSYLVANIA

A. Introduction

The earliest European settlers to enter the frontier region west of the Allegheny Mountains were trappers and traders of English and French extraction. English traders appeared in the northern sections of Western Pennsylvania as early as 1720 and the French, moving east from the Mississippi and south from Canada, arrived in southwestern Pennsylvania by 1730.

Migration west from the cities of New York, Boston, and Philadelphia was deflected south because the Allegheny Mountains prevented easy transport of the belongings pioneers carried with them. Migration funneled through the Cumberland Valley into Maryland and Virginia. It was from the western portions of these colonies that English settlers began moving north into Western Pennsylvania. By 1753 Englishmen from Virginia were present in the region surrounding present day Pittsburgh. The French population was still primarily composed of trappers and traders.

Fort Duquesne was constructed in 1754 at the confluence

Allegheny and Monongahela Rivers. The major means of transportation from Western Pennsylvania down the Ohio Valley was by water. The location of Fort Duquesne provided a means for the French to control movement down the Ohio River and up the Allegheny and Monongahela Rivers.

General Braddock's ill-fated attempt to capture this French fort did produce the first roadway from Cumberland Maryland to Western Pennsylvania in 1755. General Forbes constructed what was called Forbes Road during a successful expedition against Fort Duquesne in 1759. British supremacy was thereby established in the Upper Ohio River Basin and throughout Western Pennsylvania. Fort Pitt was constructed at the junction of the three rivers to replace the French fort. Thus military protection was provided for the subsequent "formal migration" of Virginians into the area.

Title to the lands of southwestern Pennsylvania was claimed by Pennsylvania and Virginia from 1754 until the formal state line was established in 1784. Although migration to the area decreased during the American Revolution, after the war ended, migration to Fort Pitt came in waves. The area quickly became an important trading link for those moving further west. The area was truly becoming the "Gateway to the West".

Just as the Allegheny Mountains had hindered migration to and through Western Pennsylvania, commodities from the large eastern cities were slow to arrive. Founded on the rich resources west of the mountains with swelling numbers of people settling in and to the west of the area, industry and manufacturing began to grow.

8. Lumber

The first significant industry in Western Pennsylvania was lumbering. As early as 1777 shipbuilding was occurring near the mouth of the Ohio. During the late 1790's Scotch-Irish lumbermen began clearing the extensive hardwood forests of the northern counties. Soft woods from the central and southern sections of Western Pennsylvania also contributed to the rapidly expanding timber industry.

New Englanders came to the area and commercialized lumbering. French-Canadian lumberjacks came south to fell the timber. Small numbers of saw mills sprang up in the areas east of Pittsburgh. The vast water network of the Allegheny, Monongahela and Moughogheny Basins provided transport for logs and lumber to the Pittsburgh area sawmills. The forests of Venango, Forest, Elk, Clarion, Jefferson and Clearfield Counties swelled with English, and German immigrants coming west over the Alleghenys and Scots coming from the south through Pittsburgh. By the end of the 18th century Scotch-Irish immigration occurred in unbroken waves for several years.

The land west of and including Venango County was cleared of oak for farming. The burning of oak produced charcoal and ashes which were sold provided the first commercial enterprises in the northwestern section of the region. Charcoal fed the developing iron smelting industry. Oak ashes, rich in potash, were used in the production of soap and glass, bleaching and drying cloth and the scouring of wool. The northeastern area of the region, the Allegheny plateau with poor soil, winding narrow valleys and

cool weather was unsuited to farming. The northwestern area with rolling hills and sandy soils did provide productive agricultural land.

By 1830 the northeastern area had extensive lumbering operations. Wood for homes, ships, barrels, tools and the growing network of rails (ties and railroad cars) was increasing as fast as the timber could be felled. Sawmills and lumber camps dotted the area. Water powered mills and transported timber products. Within twenty to thirty years the timber was gone. The "support enterprizes" that grew around the lumbering industry lost their economic base. As the lumbermen moved west economically depressed towns were left behind.

The east central area of the region had a similar fate. The first permanent settlers, Germans and Scotch-Irish arrived in 1791 and the first permanent settlements were established after 1796. The uncertainty of land titles and Indian attacks inhibited large movement into the area. Logs were shipped to Pittsburgh until 1884 at which time the lumbering and tanning industries united in harvesting hemlock stands for local use.

C. Transportation

Early transportation within the region was primarily based upon the area's extensive natural waterways. This water system afforded Pittsburgh the opportunity to develop as the regions major trading and industrial center.

The key to the Pittsburgh-Wheeling competition for regional and western markets was transportation. Goods were shipped from Pittsburgh to New Orleans and in 1801, 450 flatboats carried

goods to the port of New Orleans. Return by keelboat was necessary. The downstream trip took 4 to 6 weeks. However, up to 4 months was required to travel the 1,950 mile return trip. Within one decade the steamship changed the nature of water transportation forever. With rapid upstream passage possible, eastern cities shipped goods by sea to New Orleans and from there as far north as Cincinnati. This indirect route was less expensive than transporting goods over the mountains to Pittsburgh for subsequent water transport. The Harrisburg-Pittsburgh Turnpike, opened in 1814, notably stimulated commerce. The impetus given Pittsburgh was undermined however by the completion of the National Turnpike from Baltimore to Wheeling in 1818. Wheeling gained a commanding commercial lead over Pittsburgh. Pittsburgh was further reduced in stature as a commerce center by the completion of the Erie Canal in 1825. Goods could now come from and go to New York City-Buffalo, New York and Erie, Pennsylvania by water. The northern most Pennsylvania counties began to supply goods to the Erie region rather than to Pittsburgh.

Competition in the East was primarily responsible for the resurrection of Pittsburgh commerce. New York City and Baltimore threatened the commercial interests in Philadelphia. As a result of competition, the Main Line of State Works was developed and the much needed link between Philadelphia and Pittsburgh was established. The Pennsylvania Railroad was chartered in 1845 and linked the two Pennsylvania cities in 1852, the same year the Baltimore and Ohio Railroad reached Wheeling.

The coming of the railroads gave a boost to Pittsburgh

commerce and the entire Western Pennsylvania lumbering industry. The expansion of rails west of Pittsburgh, however, spelled disaster for river transport. Rail was a faster means of transport and the expanding markets of the west called for increasingly rapid and more sophisticated transport. Traffic down the Ohio River increased until 1869 and then slowly began to recede. The need for industries to be located on waterways in southwestern Pennsylvania decreased.

D. Oil

The sandy soils of the northern sections of the region held more than agricultural promise (an industry that never was to develop significantly in relation to national production).

As early as 1768 Indians made use of oil. The commercial value of the resource did not develop until the mid 19th century. Whale oil and tallow were the worlds illuminants. By 1830 the world's whale harvests began to dwindle. It was during this period that distillation of crude petroleum to yield kerosene revolutionized home lighting. In 1859 E. L. Drake had Pennsylvania's first oil well in Titusville. By the close of 1860 producing oil wells were located up and down Oil Creek Valley. The Western Pennsylvania "oil boom" was on.

Associated with the expanding oil production were two significant difficulties, oil storage and transportation. Barrels could not be imported fast enough and barrel production became an important satellite industry. Transportation also increased significantly. At its peak, a 2000 vessel fleet of various craft with carrying capacities ranging from 50 to 1500 barrels

was moving oil to Pittsburgh. As with lumber, the resource was rapidly depleted. By 1900 the majority of oil was gone. Ghost towns remained where boom towns once stood and poor small communities contained the population remaining. As an example of the rapid change Pitholes stands out. Pitholes grew to a community of 15,000 in a matter of a few months. Within one year the oil was gone and the town was empty.

F. Iron, Steel, and Coal

The manufacturing of iron west of the Allegheny Mountains began in Fayette County as early as 1790. The use of coal and iron in the region was just beginning when the War of 1812 isolated the United States from foreign sources of iron products. This fostered the development of factory systems in the area. It was the growth of the coal, iron and steel industries more than any other resource mix that shaped Western Pennsylvania.

Bituminous coal and iron ore deposits of Clarion, Clearfield and Jefferson Counties formed primary industries during the 19th century. Locally produced pig iron was shipped to Pittsburgh foundries over Red Bank Creek and the Susquehanna and Clarion Rivers. After the Civil War railroads became the primary means of transportation.

The early 19th century iron market was primarily limited to blacksmith shops. The iron products provided by the blacksmiths eventually gave way to wrought iron products, nails, wire fencing, and hardware. The increasing demand for less expensive wrought iron products proved to be an economic advantage for the region. Rich stores of cheap coal and charcoal and, later, coal suitable

for coking changed Pittsburgh from a leading commerce center into the nations primary metals center.

The opening of the Great Western Iron Works in 1839 began a 40 year iron boom in the north central section of the region. At the height of activity 40 blast furnaces were operating in the wilderness of Clarion County.

Exploitation of anthracite and soft coals were the most important factors in area industrialization. As the availability of charcoal declined and coke fired blast furnaces slowly began to appear throughout the area.

Changes in iron and coking technologies centered the iron and steel making industry in the Pittsburgh area. Originally, most coke was made in "beehive ovens" near coal mines. Volatile by-products were converted for use in production. A process brought into the United States around 1892, coking became centralized and integrated with iron and steel production. The expense of installation and operation of by-product ovens prohibited their construction in the rural areas of the region. The development of Lawrence and Mercer Counties in the 19th century was significantly influenced by the abundance of iron ore, limestone and volatile coal (prior to coking). (The completion of the Erie extension of the Pennsylvania Canal in 1844 connected the majority of area population centers with Pittsburgh and Erie.)

During the development of coking operations and technology the coal and coke of Connellsville, "ideal metallurgical coke", and its proximity to Pittsburgh were critical in pushing the city ahead of other iron and steel producing centers of the nation.

The last quarter of the 19th century saw Pittsburgh take a commanding lead. In 1875 Carnegie's Edgar Thompson Works, the first integrated steel works in the region was built, followed by the Homestead Works in 1881.

The area population began expanding rapidly, a 40% increase between 1860 and 1910. 45% of all employment was in manufacturing. By 1910 more than 80,000 miners were employed. The population in the Pittsburgh area grew from 409,000 in 1850 to 1,039,000 in 1900. Immigrants were brought into the area by the thousands to fill the demand for laborers. A quarter of the 1900 population was composed of foreign born individuals.

The Bessemer steel making process was patented in Johnstown, Pennsylvania in 1858. The city's major industry quickly became steel making. The Bessemer Process was observed in England by Andrew Carnegie and brought into the Pittsburgh Region. The Johnstown steel rolling mills stimulated growth in the area in employment and coal mining, fire brick production and transportation industries benefited.

The industrial peak for the region in general and Pittsburgh in particular lasted from 1870 to 1900.

Innovations in steel making adversely affected Pittsburgh's position as a primary metals center. The advantage of proximity to Connellsville was lost as coking requirements for steel were reduced 25% and advances in coke processing technology permitted use of lower quality coals from West Virginia and Kentucky.

The declining growth rate of railroads cut heavily into the demand for steel. A shift in demand for other commodities

precipitated the decline in Pittsburgh's share of the steel and iron markets.

The cost associated with the commodities coming into demand resulted in the basic metal price becoming a smaller portion of total costs. Thus cost considerations shifted from the primary metals to other costs and permitted less centralized steel and iron markets to form.

Although mill capacity increased the market share held by Pittsburgh declined. The ingot capacity on a national level decreased from 1/3 of total ingot capacity supplied in 1898 to 1/4 in 1920, 1/5 in 1945 and less than 1/6 in 1960.

Coupled with the changes in the steel and iron markets was a concurrent decline in coal mining. After World War I two factors contributed to the economic depression of the region.

First, a switch from coal to oil and gas home heating cut deeply into the demand for coal. Secondly, the increasing mechanization of the mining industry caused increasing unemployment.

In 1941, 90 million tons of coal were mined by approximately 83,000 miners. By 1964 production dropped to 48 million tons and employment to 16,000 miners. Although 1956 estimates indicated 36 billion tons of coal reserves existed only 17,300 miners were at work and this level of employment represented an increase over the few preceeding years.