

10929

Fee \$2.00

Dhananjayrao Gadgil Library



GIPE-PUNE-010929

UNIVERSITY OF PITTSBURGH
BUREAU OF BUSINESS RESEARCH MONOGRAPHS
NUMBER 4

REGIONAL SHIFTS IN THE BITUMINOUS
COAL INDUSTRY
With Special Reference to Pennsylvania

PITTSBURGH, PENNSYLVANIA

1935

BUREAU OF BUSINESS RESEARCH STAFF

RALPH J. WATKINS, *Director*

J. P. WATSON, *Assistant Director*

CARROLL R. DAUGHERTY
Labor Economist

GLENN E. McLAUGHLIN
Industrial Economist

WILBERT G. FRITZ
Financial Economist

BERVARD NICHOLS, *Editor*
PITTSBURGH BUSINESS REVIEW

THEODORE A. VEENSTRA
Statistician

MILDRED R. BUCKLEY, *Secretary*

REGIONAL SHIFTS IN THE BITUMINOUS COAL INDUSTRY

With Special Reference to Pennsylvania

by

WILBERT G. FRITZ

AND

THEODORE A. VEENSTRA



PUBLISHED BY

BUREAU OF BUSINESS RESEARCH
UNIVERSITY OF PITTSBURGH
PITTSBURGH, PENNSYLVANIA

X9F551:51.73.N3

G5

10929

COPYRIGHT, 1935

BY THE

UNIVERSITY OF PITTSBURGH

**A complete list of the publications of the
Bureau of Business Research, University of
Pittsburgh, is shown following the Index.**

DIRECTOR'S PREFACE

Although this study is primarily an analysis of markets served by Pennsylvania bituminous coal producers and of changes in those markets, its emphasis is directed toward those problems of instability that have characterized the entire soft coal industry in the United States during the past two decades. The difficulties that have beset the industry in western Pennsylvania in recent years have not had their origins solely in western Pennsylvania; rather they have been part and parcel of the whole complex of problems that have come to be known as "The Chaos of Coal." It is only because of the dominant significance of bituminous coal in the economic and social life of western Pennsylvania and because of the vulnerability of the industry in this section to dislocating changes in comparative production and marketing costs (owing to the relatively older age of the fields and to the greater prevalence of organization among the miners) that these problems seem to be peculiar to western Pennsylvania. In truth, they are peculiarly acute, but they are not unique.

The first eight chapters are devoted to exposition and analysis of markets, of changes in those markets, and of causal factors operating in the industry. This analysis is summarized and integrated and related to the national problem of bituminous coal in Chapter 9. Chapters 10, 11, and 12 are given over to a consideration of (1) a statement of the basis for public interest in the bituminous coal industry, (2) an examination of remedial proposals for the industry, and (3) an outline of what seem to be the essentials of a national policy for the industry.

It will be seen from a reading of the final chapters that Federal regulation of the bituminous coal industry is a central point in these essentials. To this extent the conclusions reached have a close bearing on the recent experiment represented by the Code of Fair Competition for the Bituminous Coal Industry and on the forthcoming experiment represented

by the Bituminous Coal Conservation Act of 1935 (commonly referred to as the Guffey-Snyder Coal Act). It will be noted, however, in the discussions of these measures that in important respects their provisions do not conform to the essentials outlined in the concluding chapter. If the Guffey-Snyder Coal Act escapes the fate of the Bituminous Coal Code (and other National Recovery Administration codes) on grounds of constitutionality, we shall see in the light of experience whether this type of regulatory measure can cope with the problems of over-capacity (in mines and in men) and of regional competition.

This study of the soft coal industry is part of a long-term program in regional economic research at the University of Pittsburgh, under a grant from The Buhl Foundation supplemented by funds from the University. The purpose of this program is to lay a basis for constructive action in the solution of the economic problems of the Pittsburgh district through the objective analysis of those problems. The Bureau of Business Research offers this report on the soft coal industry with the hope that it may contribute toward solution of the difficult problems of an industry basic to Pittsburgh's welfare as well as to the welfare of the nation.

RALPH J. WATKINS
Director

October, 1935

ACKNOWLEDGMENTS

This study is the product of much cooperation, not only of members of the Bureau of Business Research staff but also of many other agencies. Special acknowledgment is due Dr. J. P. Watson, whose careful editorial work and penetrating criticism have contributed in large measure to the form and substance of the study. Mr. Emmett H. Welch, formerly a member of the Bureau staff, now with the State Emergency Relief Administration of Pennsylvania, initiated the study and collected some of the data. Statistical work was done in the Bureau's statistical laboratory, mainly by Messrs. Wayne F. Daugherty and Emil G. Punzak. The graphic presentations were prepared in the drafting unit under the supervision of Mr. Charles W. Hammers, the maps by Mr. Theodore L. Pryor and the other charts by Mr. Frank W. Surovec.

Among outside organizations, the cooperation of the following persons has been especially helpful: Dr. W. H. Young, of the United States Bureau of Mines, who supplied unpublished data needed to fill gaps in the record and read and criticised the original draft of certain chapters and the first proof of the monograph; Mr. A. S. Boden, of the Coal Control Association of Western Pennsylvania, Mr. H. M. Griggs, of the Ore and Coal Exchange, and Mr. Roy S. Kern, of the Ohio Bureau of Coal Statistics, who furnished much needed data and answered many troublesome questions. It is scarcely necessary to say that these officials are in no wise responsible for the interpretations and conclusions drawn in this study.

WILBERT G. FRITZ
THEODORE A. VEENSTRA

CONTENTS

	PAGE
Director's Preface	v
Acknowledgments	vii
INTRODUCTION	1
Background of the Study	1
Purpose and Plan of the Study	5
Classification of Markets	6
Sources and Description of the Data	7
Areas Covered	10

PART I

REGIONAL SHIFTS

CHAPTER 1. BITUMINOUS COAL RESOURCES AND PRODUCTION IN PENNSYLVANIA	15
Resources in Pennsylvania	15
<i>Total Resources of the State</i>	15
<i>County Resources</i>	17
Production in Pennsylvania	19
<i>Total Production of the State</i>	19
<i>County Production</i>	21
CHAPTER 2. CHANNELS OF DISTRIBUTION FOR PENNSYLVANIA BITUMINOUS COAL	25
CHAPTER 3. DISTRIBUTION OF BITUMINOUS COAL MINED IN PENNSYLVANIA	31
The Market in Pennsylvania	34
<i>Coal Used at Mines for Power and Heat</i>	34
<i>Sales to Local Trade</i>	38
<i>Coal Made into Coke at the Mines</i>	39
<i>Rail or River Shipments to Pennsylvania Points</i>	39
Shipments by Rail or River to Markets outside the State.....	40
Railroad Fuel	41
Shipments to the Great Lakes	42
Shipments to Tidewater	43
Exports by Rail	43
Summary	44

	PAGE
CHAPTER 4. BITUMINOUS COAL RECEIPTS IN MAJOR CONSUMING AREAS, WITH SPECIAL REFERENCE TO RECEIPTS BY ALL-RAIL ROUTES FROM PENNSYLVANIA	45
Sources of Bituminous Coal Consumed in Pennsylvania	48
Sources of Bituminous Coal Consumed in New York	50
Sources of Bituminous Coal Consumed in New Jersey	52
Sources of Bituminous Coal Consumed in New England States	54
Sources of Bituminous Coal Consumed in Ohio	56
Sources of Bituminous Coal Consumed in Michigan	60
Sources of Bituminous Coal Consumed in Illinois and Indiana	62
Summary	65
 CHAPTER 5. SOURCES AND DISTRIBUTION OF BITUMINOUS COAL SHIPPED ON THE GREAT LAKES	71
Shifts among Originating Areas	71
Ports Loading Lake Cargo Coal	80
Consuming Markets for Lake Cargo Coal	84
 CHAPTER 6. SOURCES AND DISTRIBUTION OF BITUMINOUS COAL SHIPPED BY ATLANTIC TIDEWATER	88
Shifts among Originating Areas	88
Consuming Markets for Tidewater Coal	92
Originating Areas in Relation to Market Areas	94
 CHAPTER 7. FOREIGN TRADE OF THE UNITED STATES IN BITUMINOUS COAL	103
Exports	103
Imports	108
 CHAPTER 8. CHANGES IN BITUMINOUS COAL REQUIREMENTS OF MAJOR GROUPS OF CONSUMERS	109
Relative Importance of Major Groups of Coal Consumers	111
Consumption in Manufacturing	113
Consumption by Mines and Quarries	115
Consumption for Domestic Heat	115
Consumption by the Coke Industry	116
Consumption by Railroads	127
Consumption by Vessels	128
Consumption by Electric Power Plants	132
 CHAPTER 9. SUMMARY OF REGIONAL CHANGES AND OF THEIR CAUSES	136
Changes in Production	136
Changes in Market Channels	137
Changes among Major Groups of Bituminous Coal Consumers	138

CONTENTS

xi

	PAGE
Chapter 9 (continued)	
Changes within Major Market Areas	140
<i>Pennsylvania</i>	140
<i>New York</i>	141
<i>New Jersey</i>	142
<i>New England States</i>	142
<i>Ohio</i>	142
<i>Michigan, Illinois, and Indiana</i>	143
<i>Other States</i>	143
High Lights of Regional Shifts	143
Basic Causes of Shifting and of Instability	145

PART II

PUBLIC INTEREST AND A NATIONAL POLICY

CHAPTER 10. PUBLIC INTEREST IN THE BITUMINOUS COAL INDUSTRY..	149
CHAPTER 11. EXAMINATION OF PROPOSED REMEDIES	153
The Law of the Jungle	153
The Status Quo	154
Industrial Self-Government	154
Relief and Welfare Measures	155
Regulation by the States	156
Federal Regulation	157
<i>Fuel Administration in the War Period</i>	158
<i>Bituminous Coal Code under NRA</i>	159
<i>Guffey-Snyder Coal Act</i>	159
<i>Other Proposals for Federal Regulation</i>	166
Nationalization	166
CHAPTER 12. ESSENTIALS OF A NATIONAL POLICY FOR THE BITUMINOUS COAL INDUSTRY	168
General Objectives	168
Control of Capacity	169
Reduction of Waste	170
Control of Cutthroat Wage Competition	170
Adjustment of the Freight-Rate Structure	171
Social Sharing of the Cost of Instability	172
Regulation of Competing Sources of Energy	173
Relationship to Industry in General	173

APPENDICES

APPENDIX A. MISCELLANEOUS EXHIBITS	177
APPENDIX B. INTERSTATE SHIPMENTS OF BITUMINOUS COAL	181
BIBLIOGRAPHY	185
INDEX	187

LIST OF TABLES

TABLE	PAGE
1. Bituminous Coal Production in Pennsylvania and in the United States: Ten-Year Intervals, 1840-1910; Annually, 1915-1934....	19
2. Bituminous Coal Production in Each Producing County in Pennsylvania, 1916, 1917, 1918, 1929, 1933, and 1934	23
3. Tonnage of Pennsylvania Bituminous Coal Entering Each Channel of Distribution, 1915-1934	26
4. Detailed Channels of Distribution for Pennsylvania Bituminous Coal, 1915, 1917, 1918, and 1929	29
5. Distribution of Bituminous Coal Produced in Pennsylvania, According to Destination or Use, 1915 and 1929	32
6. Distribution of Bituminous Coal Produced in the Pennsylvania Area, According to Markets, 1917, 1918, and 1929.....	33
7. Distribution of Bituminous Coal Produced in the Western Pennsylvania-Panhandle District, According to Markets, 1917, 1918, and 1929	35
8. Distribution of Bituminous Coal Produced in the Central Pennsylvania District, According to Markets, 1917, 1918, and 1929..	36
9. Distribution of Bituminous Coal Produced in the Somerset-Meyersdale and Cumberland-Piedmont Districts, According to Markets, 1917, 1918, and 1929.....	37
10. Bituminous Coal Shipped by Rail, River, or Lake for Consumption in Specified States (Exclusive of Railroad and Vessel Fuel and Coal Shipped by Tidewater), According to Origin, 1915 and 1929	47
11. Bituminous Coal Destined for Consumption in Pennsylvania (Exclusive of Railroad and Vessel Fuel), According to Origin, 1917, 1918, and 1929	49
12. Bituminous Coal Destined for Consumption in New York (Exclusive of Railroad and Vessel Fuel), According to Origin, 1917, 1918, and 1929	51
13. Bituminous Coal Destined for Consumption in New Jersey (Exclusive of Railroad and Vessel Fuel), According to Origin, 1917, 1918, and 1929	53
14. Bituminous Coal Destined for Consumption in New England (Exclusive of Railroad and Vessel Fuel), According to Origin, 1917, 1918, and 1929	54

LIST OF TABLES

xiii

TABLE	PAGE
15. All-Rail and Tidewater Receipts of Bituminous Coal in New England, 1919-1934	55
16. Bituminous Coal Destined for Consumption in Ohio (Exclusive of Railroad and Vessel Fuel), According to Origin, 1917, 1918, and 1929	57
17. All-Rail Shipments of Bituminous Coal from the Appalachian Fields to Ohio, According to Origin, 1919-1934	59
18. Bituminous Coal Destined for Consumption in Michigan (Exclusive of Railroad and Vessel Fuel), According to Origin, 1917, 1918, and 1929	61
19. All-Rail Shipments of Bituminous Coal from the Appalachian Fields to Michigan, According to Origin, 1919-1934.....	63
20. Bituminous Coal Destined for Consumption in Illinois and Indiana (Exclusive of Railroad and Vessel Fuel), According to Origin, 1917, 1918, and 1929	64
21. All-Rail Shipments of Bituminous Coal from the Appalachian Fields to Illinois and Indiana, According to Origin, 1919-1934...	66
22. All-Rail Shipments of Bituminous Coal from the Appalachian Fields to the Area Consisting of Northwestern Pennsylvania, Ohio, Michigan, Indiana, and Illinois, According to Origin, 1919-1934	69
23. All-Rail Shipments of Bituminous Coal from Each of Six Appalachian Areas to the Area Consisting of Northwestern Pennsylvania, Ohio, Michigan, Illinois and Indiana, as a Percentage of Total, 1919-1934	70
24. Shipments of Bituminous Coal to Lake Erie Ports for Loading as Cargo or as Vessel Fuel, According to Origin, 1917, 1918, and 1929	73
25. Shipments of Bituminous Coal to Lake Erie Ports for Loading into Vessels as Cargo, According to Origin, 1909-1934.....	75
26. Bituminous Coal Dumped at Lake Erie Ports, According to Port and Origin, 1917, 1918, and 1929	78
27. Total Bituminous Coal Loaded into Vessels at Each Lake Erie Port, 1916-1934	79
28. Bituminous Coal Receipts at Lower Lake Ports and Shipments of Iron Ore from the Same Ports to Interior Furnaces, 1934. 81	81
29. Destination of Bituminous Coal Shipped as Cargo on the Great Lakes, 1918-1934	82
30. Tonnage of Bituminous Coal and of Iron Ore Shipped on the Great Lakes, 1916-1934	83

TABLE	PAGE
31. Shipments of Lake Cargo Bituminous Coal, According to Destination or Use, 1915, 1917, and 1929	86
32. Shipments of Bituminous Coal to Atlantic Tidewater, According to Origin, 1917, 1918, and 1929	88
33. Loadings of Bituminous Coal at Atlantic Tidewater Ports, According to Origin, 1919-1934	91
34. Loadings of Bituminous Coal at Atlantic Tidewater Ports, According to Destination or Use, 1917-1934	93
35. Shipments of Bituminous Coal (Exclusive of Exports and Railroad and Vessel Fuel) by Way of Atlantic Tidewater Ports, According to Destination, 1917, 1918, and 1929	94
36. Loadings of Bituminous Coal at Each Atlantic Port, 1917-1934..	95
37. Loadings of Bituminous Coal at New York Harbor, by Destination or Use and by Originating District	97
38. Loadings of Bituminous Coal at Philadelphia Harbor, by Destination or Use and by Originating District	98
39. Loadings of Bituminous Coal at Baltimore Harbor, by Destination or Use and by Originating District	99
40. Loadings of Bituminous Coal at Hampton Roads Harbor, by Destination or Use and by Originating District	100
41. Exports of Bituminous Coal from Customs Districts on the Canadian Border, Total Exports to Canada, and Total Exports to Other Countries, 1915-1934	104
42. Exports of Bituminous Coal from the Northern and Southern Appalachian Fields, According to Origin, 1915, 1917, 1918, and 1929	105
43. Exports of Bituminous Coal from Atlantic Customs Districts, 1915-1934	106
44. Imports of Bituminous Coal to the United States, by Origin and by Destination or Use	107
45. Bituminous Coal Consumption (Exclusive of Locomotive and Vessel Fuel) in Pennsylvania and in Fourteen Northeastern States, 1917 and 1929, and in the United States, 1917, 1923, and 1929	110
46. Consumption of Bituminous Coal by Manufacturing Industries in Pennsylvania and in Fourteen Northeastern States, and by All Classes of Consumers in the United States, 1909, 1914, 1919, 1923, and 1929	112
47. Bituminous Coal Used in the Manufacture of Coke and Amount of Coke Produced: Pennsylvania and the United States, 1916-1934	119

LIST OF TABLES

xv

TABLE	PAGE
48. Distribution of Coke Produced in Pennsylvania to Specified States, and Total Coke Consumption in Those States, 1916 and 1929	121
49. Coke Consumption in Pennsylvania, According to Origin, 1916 and 1929	123
50. Bituminous Coal Used in the Manufacture of Coke in Specified States, According to Origin, 1916, 1917, 1929, and 1933.....	125
51. Bituminous Coal Delivered to Class I Railroads in the United States for Railroad Fuel, According to Origin, 1917, 1928, and 1929	126
52. Bituminous Coal Delivered to Railroads in the United States for Railroad Fuel, by Origin and by Delivery Route, 1916, 1917, 1918, and 1929	129
53. Bituminous Coal Supplied to Vessels at Lower Lake Ports and at Atlantic Ports for Vessel Fuel, by Origin, 1915, 1917, 1918, and 1929	130
54. Bituminous Coal Loaded into Vessels for Vessel Fuel, 1915-1934	131
55. Bituminous Coal Used by Electric Public Utility Power Plants in the United States, by Consuming Area and by Originating Area, 1928	134

EXHIBIT

A. Bituminous Coal Resources in Pennsylvania, by Counties.....	177
B. Bituminous Coal Fields Included in Each Originating Area....	178
C. Bituminous Coal Shipped to Atlantic Ports, by Origin and by Destination or Use, 1917 and 1918	180
D. Interstate Commerce in Bituminous Coal Produced in Pennsylvania and in Three Major Competitive States, 1915 and 1929..	183

LIST OF CHARTS

CHART	PAGE
1. Bituminous Coal Districts in the Pennsylvania Area	10
2. Northern and Southern Appalachian Bituminous Coal Fields. . .	12
3. Original Deposits of Bituminous Coal in Pennsylvania. Amount Recoverable at the End of 1926, and Amount Mined Out or Lost in Mining through 1926, by County	16
4. Bituminous Coal Production: United States, Pennsylvania, West Virginia, Kentucky, and Ohio, Annual, 1840-1934	18
5. Per Cent of National Bituminous Coal Output Produced in Pennsylvania and Per Cent in Other Major Coal States, 1840-1934	20
6. Bituminous Coal Production in Each Producing County of Pennsylvania in 1929	22
7. Bituminous Coal Production in Each of the Eight Leading Pennsylvania Counties, Annual, 1909-1934	24
8. Tonnage of Pennsylvania Bituminous Coal Entering Each Channel of Distribution, 1915 and 1929	25
9. Shipments of Coal on the Allegheny River, the Monongahela River, and the Upper Part of the Ohio River, 1929	27
10. Relative Importance of Various Outlets for Pennsylvania Bituminous Coal in 1929	31
11. Amount of Bituminous Coal Received in New England by All-Rail Routes and Amount Loaded at Each of the Four Main Originating Ports for Shipment by Vessel to New England, Annual, 1919-1934	56
12. All-Rail Shipments of Bituminous Coal to Ohio from Each of Six Appalachian Areas, Annual, 1919-1934	58
13. All-Rail Shipments of Bituminous Coal from Each of Six Appalachian Areas to the Area Composed of Ohio, Michigan, Illinois, Indiana, and Northwestern Pennsylvania, Annual, 1919-1934	68
14. Lake Cargo Bituminous Coal Shipments in 1929, According to Origin and Destination	72
15. Per Cent of Lake Cargo Coal Shipments Originating in Each Major Producing Area, Every Fifth Year, 1909-1934.....	74

LIST OF TABLES

xvii

CHART	PAGE
16. Annual Shipments of Bituminous Coal to Great Lakes Ports for Loading into Vessels as Cargo, According to Source, 1909-1934	76
17. Tonnage of Bituminous Coal Shipped as Lake Cargo to Each of the Great Lakes, 1919, 1923, 1929, and 1934	85
18. Tidewater Bituminous Coal Shipments in 1929, According to Origin and Destination	89
19. Annual Loadings of Bituminous Coal at Atlantic Tidewater, According to Origin, 1919-1934	92
20. Annual Tidewater Loadings of Bituminous Coal, by Ports, 1917-1934	96
21. Percentage Distribution of Bituminous Coal Consumption—Exclusive of Railroad, Vessel, and Domestic—According to Industry, 1929: Pennsylvania, 14 Northeastern States, and United States	111
22. Bituminous Coal Consumed Annually in the Manufacture of Coke in Pennsylvania: Beehive, By-Product, and Total, 1916-1934	118
23. Consumption of Coke in Specified States, and Portion Produced in Pennsylvania, 1916 and 1929	122
24. Pennsylvania Bituminous Coal Used in the Manufacture of Coke: Beehive and By-Product, Selected Years	124

Introduction

Machinery and power are key words of our industrial civilization. Bituminous coal is predominantly the source of power for our machinery and is, therefore, indispensable to the machine age.

Background of the Study

The bituminous coal industry is characterized by great instability. That instability is in part a result of factors in the industry itself; it is in part a result of instability in the market for coal. Seasonal variations, cyclical booms and depressions, the uneven march of technological change, irregularities traceable to disagreement between operators and miners, and occasional variation arising from failures of transportation—these influences in continually changing combination produce in the bituminous coal industry a chronic general condition of instability. Among the areas producing bituminous coal, the timing, the intensity, and the duration of changes differ widely, because of differences in quality of coal, in richness and accessibility of seams, in technique of mining, in labor conditions and labor relations, in transportation facilities and freight rates, and in markets. Some differences among areas are short-lived and of no great consequence; some, however, have been sustained for long periods and have led to regional shifts of grave consequence. These major regional shifts are the primary subject matter of this study.

The Pennsylvania bituminous coal districts—lying in the western half of the state—comprise the larger part of the old northern Appalachian producing fields. Regional shifts that have been mentioned above have been felt keenly in western Pennsylvania and, therefore, have been of first importance to the great industrial area vaguely described as the Pittsburgh district.

In the regional economic research program within which this study is laid out, the focus of attention is on the industrial district centering in Pittsburgh. In line with that program,

the focus of this study will be on the Pennsylvania bituminous coal area. Such focus, it should be understood at the outset, is not chosen with the purpose of producing a sectionalistic pamphlet. The effects of the disorder in the coal industry may be viewed sectionally; but no one should harbor the delusion that remedies composed of sectional patchwork will bring order to the industry. The bituminous coal problem is a national problem.

Bituminous coal is the most important natural resource of western Pennsylvania, and the existence of abundant quantities of good coal has been a major reason for industrial development in the area. Besides providing the basis for numerous types of processing and fabricating industries which tend to locate near the source of fuel, the coal industry is the means of livelihood for a large population; and change in the industry may be translated into terms of change in the economic well-being of the population. In 1929, when business generally throughout the country was brisk, approximately 144 million tons of bituminous coal, with a total value at the mine of \$262 million, were produced in Pennsylvania. More than 126,000 persons were employed directly in the bituminous coal industry in the state in that year; their wages and salaries aggregated \$169 million.¹

The year 1929, however, may be rated good in the bituminous coal industry in Pennsylvania only when considered with respect to a sharply declining trend. In the midst of the post-War boom era, the coal industry in Pennsylvania began a rapid decline. Although bituminous coal production in the United States in 1929 was 535 million tons, or 95 per cent of that in 1923 and 106 per cent of that in 1916, production in Pennsylvania in 1929 was 144 million tons, or only 83 per cent as much as production in 1923 and 84 per cent as much as in 1916. In other words, Pennsylvania producers, as a group, had not held their own against the producers in competing areas.

Before 1916 the industry in Pennsylvania showed a persistent growth.² What occurred in the industry or in the coal

¹ *Census of Mines and Quarries: 1929, Fifteenth Census of the United States: Pennsylvania, Tables 2 and 8.*

² Production trends are discussed more fully in Chapter 1.

markets to cause the slump after 1916? An answer concerning shifts in markets is given in this study in so far as available information will permit. Salient facts on changes in utilization of fuel will be introduced to help explain market changes. Two predominant elements in delivered cost—wage rates and freight rates—will appear in the picture often, particularly with reference to regional shifts that appear to be attributable to changes in wage differentials and changes in freight-rate differentials.

Deposits of bituminous coal are relatively widely scattered, and, although there are large operating units, nothing like monopolistic control of the industry has developed. The bituminous coal industry has remained highly competitive. With increase in demand new mines are opened, the chief factor limiting expansion being the necessity of railroad connections if large commercial outputs are to be secured. Competition among railroads for tonnage has, to a large extent, made inoperative this limitation to expansion of the supply of coal. Not only is competition keen among the various producers of coal, but bituminous coal must compete in the fuel market with other sources of heat and energy, mainly oil, natural gas, anthracite, and water power. Because of these highly competitive conditions the industry is subject to many and rapid changes, particularly to shifts of demand from one producing district to another because of difference in costs or in quality of coal.

Desirable and undesirable changes in the coal industry are intermingled, and the two usually cannot be distinguished without considerable study of their effects both on the industry and on the general national economy. If an immediate point of view is taken, changes which accommodate the industry to basic economic developments are desirable in that production is favored in those mines which produce efficiently and which have advantages such as readily accessible coal, superior-quality coal, and nearness to consuming markets.

On the other hand, the changes which encourage the skimming of the best and most readily accessible coal and the wastage of the rest are to be regarded as undesirable from the point of view of conservation of coal resources. Other unde-

sirable elements in these changes are the hardships imposed on numerous miners and the loss of capital by mine operators and investors. Some of the shifts in coal production—for example, the shifting of operations from one producing district to another because of lower labor standards—have few or no redeeming features. In this class also are those changes resulting solely from illogical freight-rate adjustments.

The feverish industrial activity of the War years resulted in the opening of many new mines, especially in the fields of West Virginia and of Kentucky.³ When activity slackened in the post-War years, these new mines continued to compete with the older producers in a reduced market. Moreover, since the War, competing sources of energy have been tapped on an enlarged scale. Petroleum, natural gas, and water power have made serious inroads on the markets for coal.⁴

Increased efficiency in use also has curtailed the demand for coal. Large users, such as railroads, electric power plants, and iron and steel plants, have greatly reduced their consumption per unit of work. Between 1919 and 1930, there was an average reduction of 49 per cent in the consumption of coal per kilowatt hour of electricity generated. Railroads in 1930 used 30 per cent less coal per ton-mile than in 1918. The amount of coking coal used in making a ton of pig iron was reduced approximately 17 per cent between 1918 and 1930. Conservation of heat values through the use of the by-product method of coke production further increased the amount of useful energy obtainable from coal.⁵ No doubt some of the alleged economies in the utilization of coal represent in fact merely the use of better coal, i. e., either coal of originally better quality or coal better graded and better cleaned by the operators before it is put on the market. But there can be no doubt of significant improvements in the utilization of fuel.

These changes have been instrumental in preventing a continuation in the post-War period of the markedly upward trend existing in the pre-War period. Although the production

³ On number of mines in operation, F. G. Tryon, L. Mann, and H. O. Rogers, "Coal" in *Mineral Resources of the United States, 1930*, Part II, Bureau of Mines, Table 21, p. 639.

⁴ *Ibid.*, Tables 7, 8, and 9, pp. 623-625.

⁵ *Ibid.*, Tables 64-67, pp. 680 and 681.

of the entire country remained more or less stationary during the post-War period, significant changes occurred in the various producing districts. Differences in quality of coal, in production conditions, in costs, and in market demands resulted in large shifts in production. As a consequence many problems of adjustment have arisen, but there has been no power adequate to cope with the situation. The shifts in production together with the attempt made to counteract them explain much of the chaos, strife, lost time, and waste of capital in the industry.

As a consequence of this turmoil in the industry, appeals have been made for governmental help and intervention. These appeals have come alike from labor, coal operators, and coal consumers. The pitiful conditions of unemployed miners have been much before the public. Operators have been almost constantly before the state utility commissions, the Interstate Commerce Commission, and the courts, either attempting to secure freight-rate adjustments which would give their individual companies better competitive conditions or trying to block such attempts on the part of their competitors. Consumers also have been active, guarding against any change which would increase the price they have to pay for coal. But the power of Government to act is limited and not clearly defined. The Code of Fair Competition for the Bituminous Coal Industry—the code in effect under NRA—appeared for a time to provide at least a partial answer to the difficulties of the industry; but with the abandonment of the Code, following the Supreme Court decision in the Schechter case, the industry was left almost where it was before the NRA. The Bituminous Coal Conservation Act of 1935, commonly known as the Guffey-Snyder Act, represents an attempt to provide solutions for some of the ills of the industry.

Purpose and Plan of the Study

The aim in this study is two-fold. In the first place, the purpose is to bring together and analyze the data on the distribution of bituminous coal so as to make accessible essential facts on which a comprehensive judgment may be based. Because of the emphasis on Pennsylvania, arising from the re-

gional focus of the broader economic research program within which this study is laid out, the descriptive and analytical content of Chapters 1-9 may in a sense be considered a case study of regional shifts in the coal industry. In the second place, the purpose is to examine the several types of proposed remedies for the ills of the bituminous coal industry and to summarize what seem to be the essential elements of a national coal policy. The study will be developed about the following points:

1. Resources and production of bituminous coal in Pennsylvania
2. Channels of distribution for Pennsylvania bituminous coal
3. Changes in the destinations of shipments of Pennsylvania bituminous coal
4. Changes in the importance of Pennsylvania bituminous coal in various markets
5. Effect on Pennsylvania mines of changes in consumption
6. Public interest in the bituminous coal industry
7. Characteristics of remedial proposals
8. Essentials of a national policy for the bituminous coal industry

Discussion of resources and of production will provide the background material for the study. Within the broad scope of total coal resources, the rate of production might far exceed that of the past; but, in any specific producing area, the character and the accessibility of the coal reserves are distinctly limiting factors to production and to distribution. A sharp reduction of output in the face of abundant resources, however, indicates that a change of marked influence has taken place either in competitive conditions or in consumption requirements of coal users. Losses in production in Pennsylvania will be related to changes in the volume moving through the several channels of distribution, and extensive consideration will be given to the changing share of Pennsylvania and of major competing areas in the markets reached through the several channels. Available data also are brought together to indicate changes in the consumption of bituminous coal.

Classification of Markets

The markets for Pennsylvania bituminous coal are classified for this study into three groups, namely, markets known to be within Pennsylvania, markets in other states to the extent to which they can be segregated, and markets not classi-

fied by states. Bituminous coal known to be used within Pennsylvania is classified as follows: (1) that used at mines for heat and power, (2) that made into coke at the mines, (3) that sold to local trade (i. e., not shipped by rail or by river); and (4) that shipped by rail or river to destinations in Pennsylvania, exclusive of railroad fuel. Markets for Pennsylvania coal in other states are classified by states only with respect to the coal moved from Pennsylvania by all-rail or river routes, exclusive of railroad fuel. Markets not classified by states cover (1) coal delivered by all-rail routes to be used as railroad fuel, (2) coal shipped to Lake Erie ports for vessel fuel or for transshipment as cargo, (3) coal shipped to tidewater ports for vessel fuel or for transshipment in vessels to domestic or foreign destinations, and (4) coal exported by rail. Movement of coal by car ferry on the Great Lakes or at tidewater is counted as all-rail transportation. These classifications are taken from studies made by the United States Bureau of Mines of the distribution of bituminous coal in 1915, 1917, 1918, and 1929.

Sources and Description of the Data

In August, 1931 the Bureau of Mines began publication of a monthly mimeographed report entitled *Distribution of Coal Shipments*, also frequently referred to as the "Monthly Coal Distribution Report." Among the first six issues there were five mimeographed supplements. Supplements to the first, third, fourth, and sixth reports gave data on the distribution of coal in 1929 from the various producing areas in the country, together with comparative figures for 1917 and 1918, taken from *Mineral Resources of the United States*, for those years. The supplement to the second report gave data on the distribution of coke in 1929; and data on coke distribution for 1916 are available in *Mineral Resources of the United States* for 1916.

A description of the information was given at the beginning of each supplement, although the first report gave the most detailed explanation.⁶ The study was undertaken by the Bureau of Mines to meet the needs of shippers, distributors,

⁶ The description that follows is prepared from the explanations prefacing the distribution reports released by the Bureau of Mines, as well as from the parenthetical notes preceding tables shown in those reports.

and traffic men for information on the markets open to the coals of each field. The year 1929 was chosen because it was believed to be "more representative of normal conditions" than either of the depression years 1930 and 1931.

The data on coal not shipped by railroad were obtained by the Bureau of Mines from mine operators; "commercial" rail shipments (i. e., shipments for non-railroad use) and railroad fuel, including coal taken by locomotives at the mine tipple, were reported by originating railroads. Each of the railroads originating coal supplied a statement of the tonnage moving from the mines on its lines in each field to destinations in each consuming state. Coal received by railroads from rail connections was excluded so that duplication might be avoided when the reports of all carriers were combined. In order to show the state of ultimate destination, it was sometimes necessary to consult the waybills at considerable labor and expense.

The shipments reported by the railroads checked very closely with rail shipments reported by the mine operators. Usually the tonnage reported by the carriers was slightly larger, in part because it included railroad fuel coal taken by locomotives at the mine tipple, which was reported by the mine operator as "local sales" (not shipped by rail or river). The discrepancy, however, was seldom more than one or two per cent. The statements of the carriers were accepted as reported, and no effort was made to introduce an arbitrary adjustment.

Railroad fuel coal could not be identified with consignments to particular states. Coal delivered to a single rail connection may go to several fuel depots, and coal from a single fuel depot may be consumed over several states. The traffic managers were asked to segregate railroad fuel from coal consigned to other consumers. They could easily separate the non-revenue fuel ("deadhead" or "company" coal), but a number reported that they could not segregate railroad fuel coal consigned to other carriers. In order to determine the tonnage of revenue railroad fuel wherever it was not reported, the Bureau of Mines obtained from the purchasing agents of

receiving carriers statements covering the sources of coal purchased by them. With respect to coal purchased on other lines, these statements showed the names of the originating railroads and the connecting points at which it was received. By means of these reports, the Bureau of Mines approximated closely the amount of railroad fuel coal originating in each producing area.

In the preparation of the coal distribution reports, the Bureau of Mines supplemented the reports from the railroads and those from coal operators with reports from the Ohio Bureau of Coal Statistics, the Illinois Freight Association, the Maher Coal Bureau, the Southern Wyoming Coal Operators' Association, and the Colorado and New Mexico Coal Association.

A comparison of the coal distribution data for 1929 with those for 1917 and 1918 has limitations. Although bituminous coal production and business in general were comparatively high in each of those years, it must be remembered that the World War disrupted the regular marketing channels in 1917 and 1918, especially in the latter year. Moreover, some of the coal-producing districts for which separate data are given in the 1929 reports are shown only in combination in reports for the earlier years. Therefore, arrangement for comparison of distribution in 1929 with that in 1917 and 1918 necessitated the grouping of the districts in conformity with the combinations used in earlier years. Another limitation is that distribution data available for only a few scattered years may not be fully representative of some producing districts and some markets.

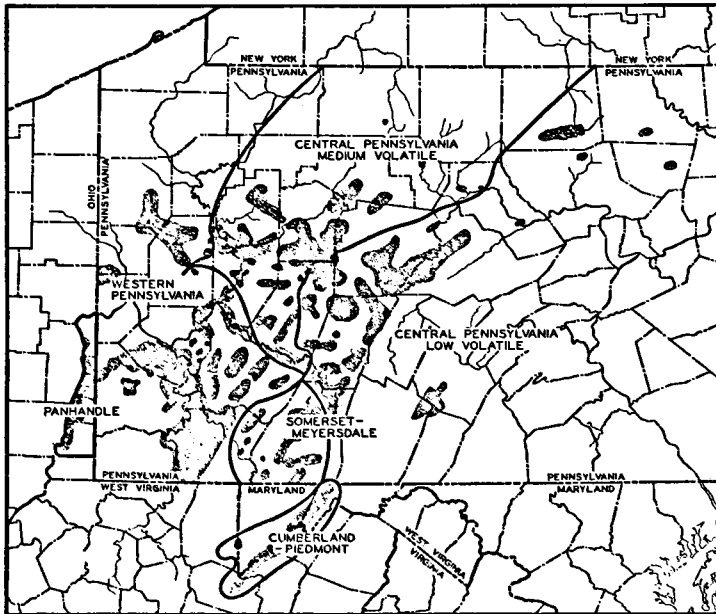
Because of these limitations, a large amount of supporting data has been introduced into this study, the purpose being at times to give information for consecutive years and at other times to give data for years that afford a better comparison than that between 1929 and 1917-1918. Collateral data, in addition to those obtained from the Bureau of Mines, were derived by the Bureau of Business Research from compilations made by the Pennsylvania Geological Survey, the Ore and Coal Exchange, the Ohio Bureau of Coal Statistics, the Tidewater

Bituminous Coal Statistical Bureau, and the Coal Control Association of Western Pennsylvania, as well as from such publications as *The Coal Trade* (not published after 1921), *Saward's Annual*, the *Annual Statistical Report of the American Iron and Steel Institute*, and the *Monthly Summary of Foreign Commerce of the United States*.

Areas Covered

Throughout this study, Pennsylvania data are presented for small producing districts; for other states, there is less differentiation with respect to the subdivisions. The grouping of fields conforms mainly with the combinations made by the Bureau of Mines in the distribution studies of 1917, 1918, and

Chart 1
BITUMINOUS COAL DISTRICTS IN THE PENNSYLVANIA AREA
(Shaded Areas Indicate Producing Fields)



Source: Maps supplied by the United States Bureau of Mines and the Coal Control Association of Western Pennsylvania.

1929. In some of the tables, however, a special effort is made to follow state lines more closely than they can be followed with the information available for 1917 and 1918.

Distribution data for 1917, 1918, and 1929 are shown in this study for the following areas:

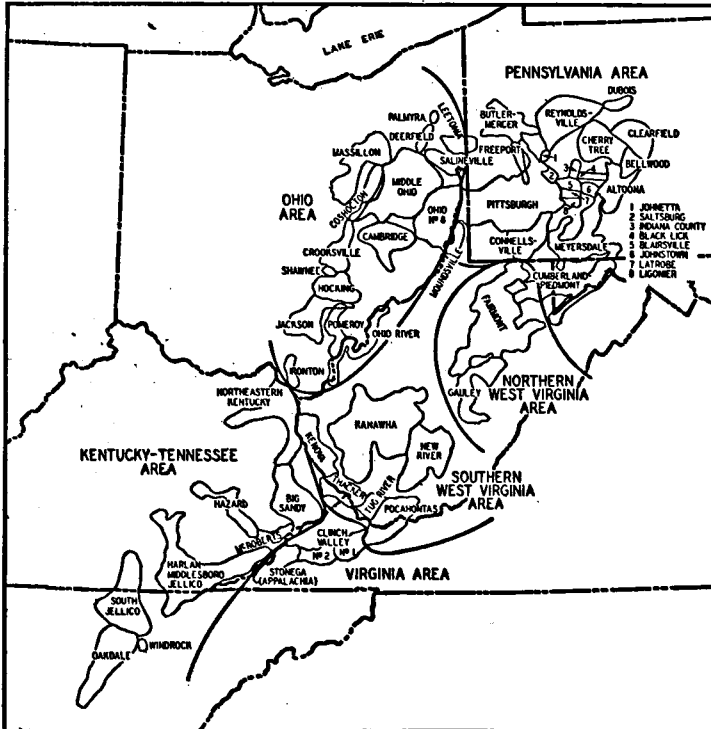
1. Pennsylvania area, shown in Chart 1, composed of the following districts, for which separate data are shown:
 - a. Western Pennsylvania and West Virginia Panhandle district, referred to in this study as the western Pennsylvania-Panhandle district
 - b. Central Pennsylvania district (medium-volatile and low-volatile)
 - c. Somerset-Meyersdale and Cumberland-Piedmont districts, the latter being in Maryland and West Virginia
2. Ohio area, consisting of the northern Ohio district and the southern Ohio district, embracing all coal mining in Ohio and, in addition, a small amount in West Virginia, opposite the southern Ohio fields
3. West Virginia area, consisting of:
 - a. Northern West Virginia area, which covers all the northern part of the state except the Panhandle, the part included in the Cumberland-Piedmont district, and the part included in the Ohio area
 - b. Southern West Virginia area, consisting of the following districts: New River-Winding Gulf, Pocahontas-Tug River (including Pocahontas extension into Tazewell County, Virginia), Kanawha, Logan, and Kenova-Thacker (including a small strip in eastern Kentucky)
4. Virginia area, which consists of all coal fields in Virginia except the extension of the Pocahontas district into the northern part of Tazewell County
5. Eastern Kentucky-Tennessee area, which consists of the following districts: northeastern Kentucky, McRoberts, Hazard, Harlan-Benham, southeastern Kentucky, Tennessee, and Georgia

It should be observed that these areas will be used mainly in connection with the Bureau of Mines distribution data for the comparison of 1929 with 1917 and 1918. For other areas, suitable descriptive terms will be used and the boundaries will be made clear. It is usually necessary to describe coal-producing areas in terms of the fields covered. A reference map showing the approximate location of coal fields is included, therefore, as Chart 2.

The bituminous coal fields in Pennsylvania, Ohio, Maryland, and northern West Virginia are frequently referred to hereafter as the northern Appalachian fields or as the northern

fields. The fields in southern West Virginia, eastern Kentucky, Virginia, and Tennessee are referred to as the southern Appalachian fields or as the southern fields.

Chart 2
NORTHERN AND SOUTHERN APPALACHIAN BITUMINOUS
COAL FIELDS*



*The fields shown are those generally used by the railroads in reporting originating shipments. These fields have been outlined from maps supplied by the Coal Control Association of Western Pennsylvania. The areas shown are those used by the Bureau of Business Research for presentation of the Bureau of Mines distribution data for 1917, 1918, and 1929.

PART I

REGIONAL SHIFTS

CHAPTER 1

Bituminous Coal Resources and Production in Pennsylvania

Resources in Pennsylvania

(a) *Total Resources of the State*

The bituminous coal resources of Pennsylvania are concentrated mainly in 15 western counties of the state (Chart 3). An estimate of bituminous coal resources in Pennsylvania was made in 1909 by M. R. Campbell, of the United States Geological Survey.⁷ Campbell estimated that Pennsylvania originally had 112,474,000,000 net tons of bituminous coal, spread over an area of 14,200 square miles. The supply remaining unmined at the close of 1907 was estimated to be 109,804,000,000 net tons, or 492 times the production of that year.

Late in 1921, the Pennsylvania Geological Survey began an investigation to determine more accurately the coal resources of the state. The original work was done by John F. Reese; the revision and supplementing of the original estimates, by James D. Sisler. The final estimates covered information gathered through 1926.⁸ Summaries were prepared to show the quantity of coal in the ground in seams of 18 inches or more thickness when mining began in Pennsylvania, the quantity mined out or lost in mining, and the quantity recoverable.⁹ Original deposits of bituminous coal were estimated to have been 75,093,459,000 net tons; coal mined out or lost from the beginning of mining to the end of 1926 was estimated at 5,823,163,000 tons; and recoverable coal in the ground at the end of 1926 was estimated at 44,022,840,000 tons. The Reese-Sisler estimates were based on intensive studies. Their estimate of original deposits was considerably lower than Campbell's esti-

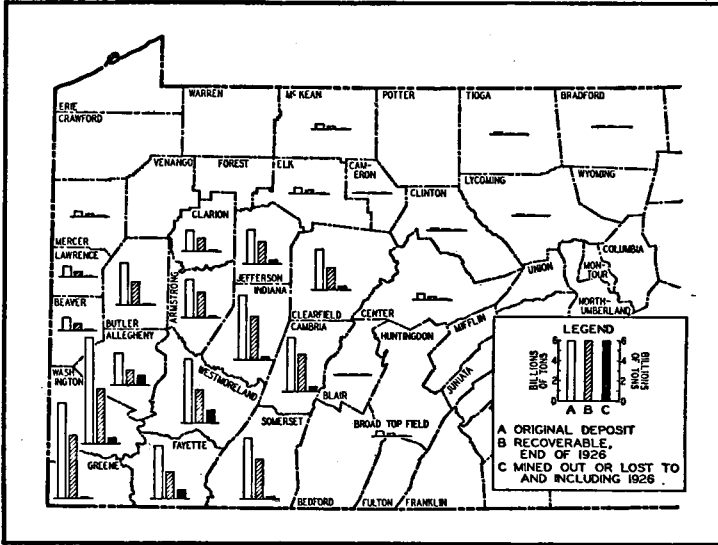
⁷ U. S. Geological Survey, Bulletin 394, 1909, p. 23.

⁸ *Bituminous Coal Fields of Pennsylvania*, Part I (by George H. Ashley), pp. 125-162, and Part III (by John F. Reese and James D. Sisler), pp. 1-9: Pennsylvania Geological Survey, Bulletin M6, 1928.

⁹ Data are presented in Exhibit A of Appendix A.

Chart 3

ORIGINAL DEPOSITS OF BITUMINOUS COAL IN PENNSYLVANIA, AMOUNT RECOVERABLE AT THE END OF 1926, AND AMOUNT MINED OUT OR LOST IN MINING THROUGH 1926, BY COUNTY
(Data in Exhibit A of Appendix A)



mate, but it included only seams of 18 inches or more thickness, whereas the Campbell estimate included all seams down to 14 inches thickness.

The 44 billion tons of recoverable bituminous coal in Pennsylvania would last 321 years at the 1925 rate of mining (137 million tons per year). At the rate in the peak year (179 million tons in 1918) it would last 246 years; at the 1929 rate (144 million tons), 306 years. Reduction of losses in mining, that is, an increase in the proportion recovered, would lengthen the life of the mines. On the other hand, the rates of removal in the past apply in general to the better seams. With reference to the remaining thick-seam coal, the Pennsylvania Geological Survey reported in 1928: "Pennsylvania's thick coal is very limited as compared with that in other states. Probably the total quantity of coal in Pennsylvania in beds over 5 or 6 feet thick is not over 10 billion tons." "... the most

readily accessible and best beds have already been exploited
...¹⁰

A study made in 1913 by M. R. Campbell, of the United States Geological Survey, for the Twelfth International Geological Congress indicates that eight states had larger original coal deposits than Pennsylvania. In the order of rank, these states are Wyoming, North Dakota, Colorado, Montana, Utah, Illinois, New Mexico, and West Virginia.¹¹ Except in Maryland, West Virginia, Virginia, and eastern Kentucky, however, there is very little bituminous coal ranking as high in quality as that in Pennsylvania.¹²

It is apparent from the foregoing facts that Pennsylvania originally had a moderately large supply of superior-quality bituminous coal, that production since the beginning of mining has removed or made inaccessible a considerable proportion of the coal, but that the coal remaining in the ground, extracted even at rates heretofore prevailing in prosperity, would not be near exhaustion for more than two centuries. No other significant coal-producing state, except Ohio—with far less output, is as close to the great northeastern consuming markets. Favorable geographic location is an advantage to which the Pennsylvania mines may lay just claim.

(b) *County Resources*

The largest original deposits of bituminous coal in Pennsylvania were in the following counties (named in the order of rank): Washington, Greene, Westmoreland, Indiana, Somerset, Cambria, Fayette, Butler, Clearfield, Armstrong, Jefferson, Allegheny, and Clarion (Chart 3, and Exhibit A in

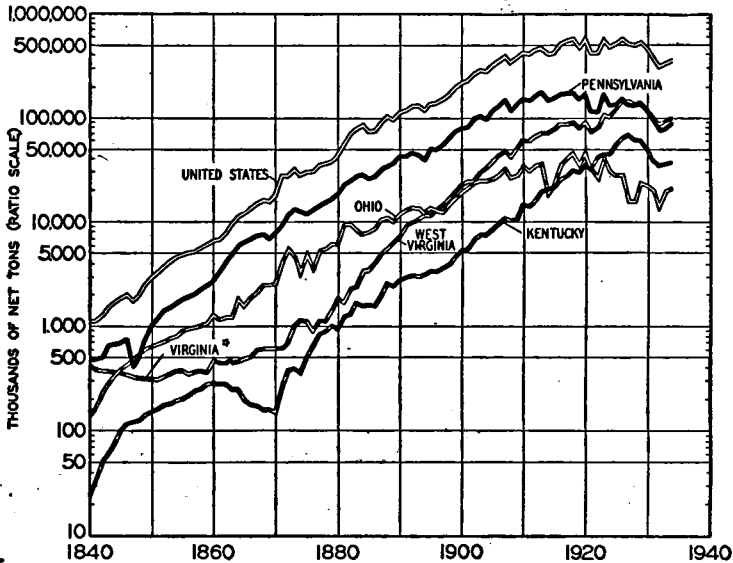
¹⁰ *Bituminous Coal Fields of Pennsylvania*, Part I, p. 162, and Part III, p. 5.

¹¹ *Ibid.*, Part I, p. 154.

¹² "The Appalachian region is the greatest storehouse of high-rank coal in the United States, if not in the whole world..." "The Eastern coal province contains probably nine-tenths of the high-rank coal (bituminous and anthracite) of the country." The coal of the Appalachian region is generally of high rank, but it shows considerable variation in an east-west direction. The percentage of fixed carbon in the coals increases from west to east, and the volatile matter decreases in the same direction. There is not much difference in rank between the bituminous coals in the heart of the Pennsylvania producing area and those in the heart of the producing areas farther south along the Appalachian Mountains. The heat value, for example, is close to 14,000 B.T.U. per ton. The coals of Montana, Wyoming, and North Dakota, on the contrary, have a heat value ranging predominately from 6,000 to 10,000 B.T.U. See M. R. Campbell and J. A. Bownocker, *The Coal Fields of the United States*, United States Geological Survey, Professional Paper 100 (1929), pp. 11-12 and 27-33.

Chart 4
BITUMINOUS COAL PRODUCTION: UNITED STATES,
PENNSYLVANIA, WEST VIRGINIA*, KENTUCKY, AND OHIO,
ANNUAL, 1840-1934

(From *Mineral Resources of the United States, 1923-1931*;
Minerals Yearbook, 1932-1934)



*West Virginia was part of Virginia before 1863.

Appendix A). The greatest amount of production since the beginning of mining has taken place in Westmoreland County. Among the leading counties, however, production in relation to original deposits has gone farthest in Allegheny County, where 30.3 per cent of the original deposit had been mined out or lost by the end of 1926; the least mining in relation to reserve has taken place in Greene County. During recent years it has been found that the coal in Greene County has good coking qualities, and much of it is held by large iron and steel companies as reserves for future production of coke.¹⁸

The supply of recoverable coal in the ground at the end of 1926 was about 6.3 billion net tons in Greene County, 5.5 billion in Washington County, 4.3 billion in Indiana County,

¹⁸ *Ibid.*, p. 143.

Table 1
BITUMINOUS COAL PRODUCTION IN PENNSYLVANIA AND IN
THE UNITED STATES: TEN-YEAR INTERVALS, 1840-1910;
ANNUALLY, 1915-1934
 (Amounts in Thousands of Net Tons)

Year	United States Production	Pennsylvania Production	
		Amount	Per Cent of U. S. Production
1840	1,103	465	42.2%
1850	2,880	1,000	34.7
1860	6,494	2,691	41.4
1870	17,371	7,799	44.9
1880	42,832	18,425	43.0
1890	111,302	42,302	38.0
1900	212,316	79,842	37.6
1905	315,063	118,414	37.6
1910	417,111	150,522	36.1
1915	442,624	157,955	35.7
1916	502,520	170,295	33.9
1917	551,791	172,448	31.3
1918	579,386	178,551	30.8
1919	465,860	150,758	32.4
1920	568,667	170,608	30.0
1921	415,922	116,014	27.9
1922	422,268	113,148	26.8
1923	564,565	171,880	30.4
1924	483,686	130,634	27.0
1925	520,053	136,928	26.3
1926	573,367	153,042	26.7
1927	517,763	132,965	25.7
1928	500,745	131,202	26.2
1929	534,989	143,516	26.8
1930	467,526	124,463	26.6
1931	382,089	97,659	25.6
1932	309,710	74,776	24.1
1933	333,631	79,296	23.8
1934	358,395 ^a	89,826 ^a	25.1

Source: United States Bureau of Mines, *Mineral Resources of the United States*, (Part II), 1923, pp. 545-546, and 1930, p. 627. Data for 1931, 1932, and 1933 are from the *Minerals Yearbook*, and those for 1934 from the weekly report Number W.C.R. 919 of the Bureau of Mines.
^a Preliminary.

4.0 billion in Somerset County, 3.6 billion tons in Cambria County, and 3.3 billion in Westmoreland County. Five other counties each had a recoverable coal tonnage of between 2 and 3 billion; two additional counties had each between 1 and 2 billion.

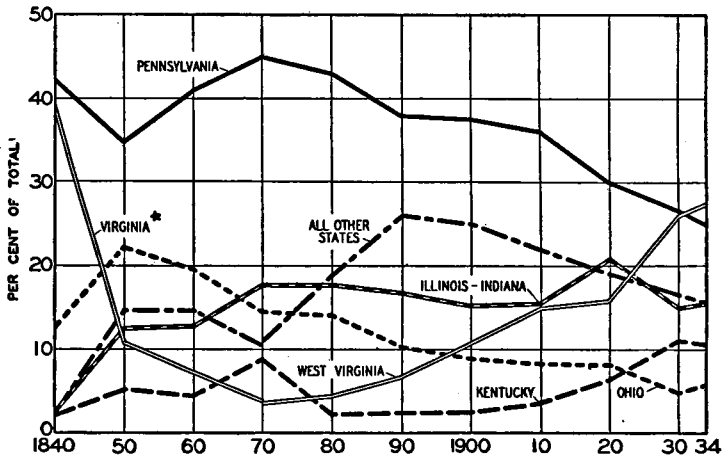
Production in Pennsylvania

(a) *Total Production of the State*

The earliest available record of bituminous coal production in Pennsylvania is that for the year 1840, when, according

Chart 5
**PER CENT OF NATIONAL BITUMINOUS COAL OUTPUT
 PRODUCED IN PENNSYLVANIA AND PER CENT
 IN OTHER MAJOR COAL STATES,
 1840-1934**

(Computed from Production Reports of United States Bureau of Mines)



to estimates published by the Bureau of Mines,¹⁴ 464,826 net tons were mined in the state (Table 1 and Chart 4). In 1850 the state total reached 1,000,000 net tons. The amount mined increased in most years from 1850 until 1900, there being occasional declines in periods of severe business recession. In 1900 almost 80 million tons were mined. Growth of the industry continued at a rapid rate through 1907, when 150 million tons were produced. After 1907 there was a retardation in the rate of growth, and since the World War the trend has been downward. Production in 1918 reached 179 million tons, an all-time high. Even in 1929, a year of great industrial activity, the aggregate was only 144 million tons.

Pennsylvania bituminous coal production has for a long time been losing ground relatively to the national total (Table 1 and Chart 5). Until the eighties, Pennsylvania production usually represented more than 40 per cent of the national total. Since the eighties, there has been a gradual, irregular

¹⁴ *Coal in 1923*, pp. 545-550.

decline in the state's percentage. In 1890 Pennsylvania tonnage was 38.0 per cent of the United States tonnage; in 1900, 37.6 per cent; in 1910, 36.1 per cent; in 1915, 35.7 per cent; and in 1918, 30.8 per cent. Since 1918 there have been some years in which the Pennsylvania share increased, other years in which it declined. Some of the irregularities may be accounted for by strikes in various localities. Losses predominated, however, and in every year of the latter half of the twenties, the state's output was less than 27 per cent of the national aggregate. In 1934 the share was only 25.1 per cent.

The fact that Pennsylvania was one of the first states producing bituminous coal is no doubt responsible for some of the relative decline in the state's importance in the industry. New fields, of course, encroach on the percentages of the old fields. Numerous factors have had an effect, often unfavorable, on the relative position of Pennsylvania bituminous coal. Some of these factors are as follows:

1. Development of new markets not convenient to Pennsylvania fields
2. Extension of transportation lines to new fields—probably of minor importance since 1908
3. Uneven effect of changes in types and qualities of coal demanded
4. Uneven effect of competing sources of energy, mainly oil, natural gas, and water power
5. Changes in the freight-rate structure, especially important changes being made when the price level rose during the World War
6. Uneven changes in the cost of production

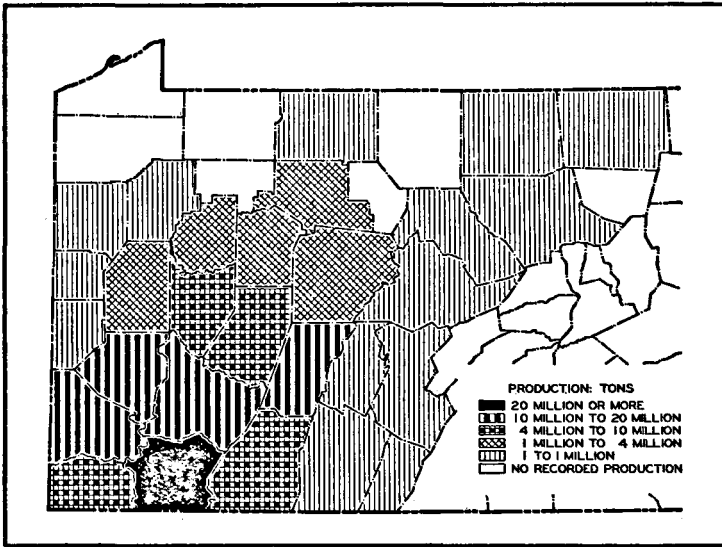
Available data do not justify any attempt at a thorough analysis of the effects of each of these factors. In the discussion of the changes in the distribution of Pennsylvania coal, however, reasons that appear to account for a significant change will be pointed out.

(b) *County Production*

The location and the relative importance in 1929 of the coal-producing counties in Pennsylvania are shown in Chart 6.

In 1929 eight counties (Allegheny, Cambria, Fayette, Greene, Indiana, Somerset, Washington, and Westmoreland) in the southwestern corner of the state, comprising 14.7 per

Chart 6
**BITUMINOUS COAL PRODUCTION IN EACH PRODUCING
 COUNTY OF PENNSYLVANIA IN 1929**
 (Data in Table 2; County Names Shown in Chart 3)



cent of the total area of the state, produced 87.4 per cent of the bituminous coal. Fayette County produced 31,400,000 tons; Washington County, 19,328,000 tons; Cambria County, 17,515,000 tons; Westmoreland County, 17,187,000 tons; Allegheny County, 16,634,000 tons; Somerset County, 8,817,000 tons; Indiana County, 8,218,000; and Greene County, 6,302,000 tons (Table 2).

Seven of the eight leading counties (Greene County being the exception) produced less coal in 1929 than in 1917, the largest decline being 38.7 per cent for Westmoreland County (Table 2). Fayette, Washington, Cambria, and Allegheny counties had declines of less than 12 per cent each between 1917 and 1929. Greene County, on the other hand, increased its production from 900,000 tons in 1917 to 6,302,000 tons in 1929. Annual production of each of the eight leading counties in the period 1909-1933 is plotted in Chart 7.

Table 2
BITUMINOUS COAL PRODUCTION IN EACH PRODUCING
COUNTY IN PENNSYLVANIA, 1916, 1917, 1918, 1929, 1933, and 1934
 (Thousands of Net Tons)

County	1916	1917	1918	1929	1933	1934
Allegheny.....	17,007	17,836	17,375	16,634	11,583	13,878
Armstrong.....	5,430	5,575	6,052	4,468	2,476	2,532
Beaver.....	92	129	129	152	84	95
Bedford.....	722	947	1,051	570	387	402
Blair.....	436	272	280	387 ^a	244	202
Butler.....	1,180	1,202	1,398	1,373	566	675
Cambria.....	19,588	19,731	20,569	17,515	12,047	12,498
Center.....	1,819	1,999	1,985	819	562	485
Clarion.....	1,369	1,380	1,608	1,473	1,180	1,306
Clearfield.....	8,877	9,337	9,376	3,944	2,774	3,073
Clinton.....	422	402	360	184	38	63
Elk.....	938	907	969	1,012	738	815
Fayette.....	34,250	32,083	32,926	31,400	10,076	11,928
Greene.....	745	900	1,269	6,302	2,742	3,754
Huntington.....	962	1,156	1,372	529	540	525
Indiana.....	11,023	12,054	12,743	8,218	5,102	6,190
Jefferson.....	5,765	5,552	5,141	2,575	1,660	1,805
Lawrence.....	^b	133	107	197	172	200
Mercer.....	615 ^b	527	691	248	226	282
Somerset.....	9,341	9,455	10,264	8,817	5,488	5,919
Tioga.....	830	867	834	164	190	207
Washington.....	18,119	21,514	23,537	19,328	11,587	13,644
Westmoreland.....	30,500	28,028	28,121	17,187	8,589	9,075
Other Counties.....	68 ^c	59 ^c	39 ^c	23 ^d	246 ^e	273
Unallocated (Wagon Mines).....	200	404 ^a	356 ^a	^f	^f	^f
Total, Pennsylvania.....	170,295	172,448	178,551	143,516	79,296	89,826

Source: *Mineral Resources of the United States* (Part II), 1918, p. 793, and 1929, pp. 813-814; and *Statistical Appendix to Minerals Yearbook*, 1934, p. 335. State totals are based on exact figures, not on rounded numbers.

^a Includes production in Fulton County.

^b Mercer County production and Lawrence County production are combined.

^c Production in Bradford, Cameron, Lycoming, and McKean counties.

^d Production in Bradford, Lycoming, McKean, and Venango counties.

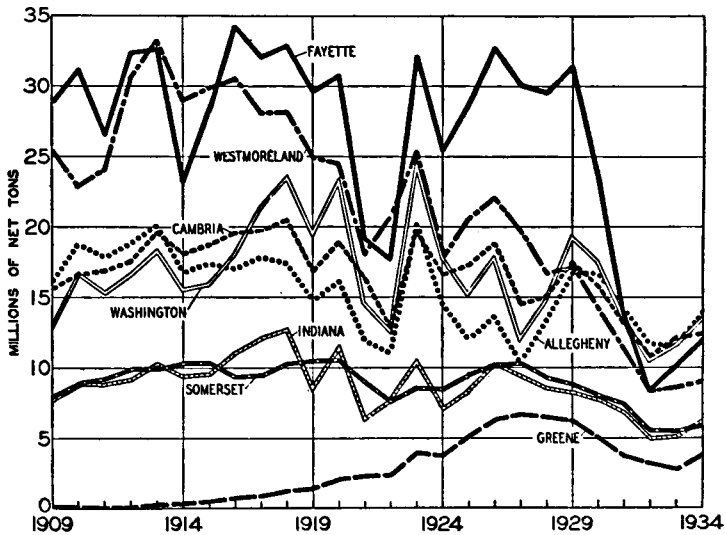
^e Production in Bradford, Fulton, Lycoming, McKean, and Venango counties.

^f There was no canvas of wagon mines producing less than 1,000 tons each per year.

Fayette County produced one and one-half times as much bituminous coal in 1929 as any other county in the state; but, in 1934, three counties—Cambria, Washington, and Allegheny—each had a greater output than Fayette County. The production in Fayette County in 1934 was a little more than one-third as much as that in either 1929 or 1917. In 1934 Westmoreland County produced about one-half as much coal as in 1929 and one-third as much as in 1917. For the state as a whole, the decline between 1929 and 1934 was 37 per cent. Close association of coal production in Fayette and Westmoreland counties with activity in the iron and steel industry accounts, in part at least, for the fact that the decline in those

counties between 1929 and 1934 was greater than the decline in counties supplying coal to domestic consumers or to industries affected less severely by the depression. Bituminous coal ordinarily is not stored for more than a few months; in consequence, there is usually a close dependence of coal production on the current rate of activity in the consuming markets.

Chart 7
BITUMINOUS COAL PRODUCTION IN EACH OF THE EIGHT LEADING PENNSYLVANIA COUNTIES, ANNUAL, 1909-1934



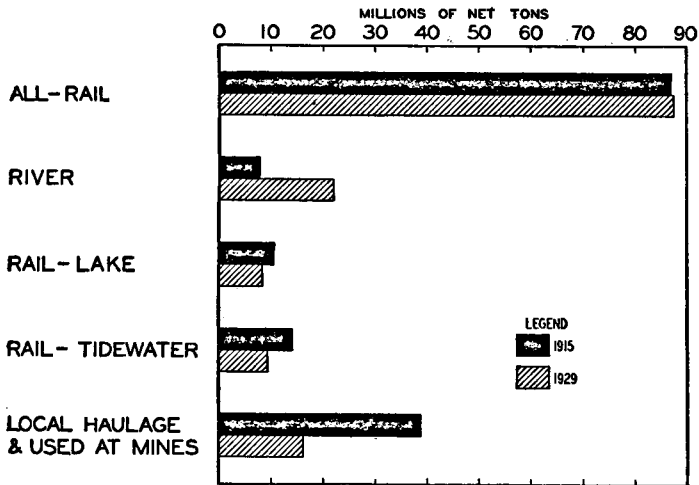
CHAPTER 2

Channels of Distribution for Pennsylvania Bituminous Coal

Bituminous coal produced in Pennsylvania is shipped from the mines mainly by railroad, but a considerable proportion is loaded on barges on the Monongahela, Allegheny, and Ohio rivers for shipment by water (Table 3). Some of the coal is used at the mines as mine fuel, some is made into coke near the mouth of the mine, and some is sold to local trade. Coal shipped by truck or wagon from the mines and coal taken by locomotives at the tipples is counted among the sales to local trade.

Much of the coal reaches the ultimate destination by combination routes. A small tonnage is first shipped by rail and later by river, and undoubtedly a small tonnage is first shipped by river and then transhipped by rail. The principal combination channels are the railroad-Great Lakes routes and the railroad-tide-

Chart 8
TONNAGE OF PENNSYLVANIA BITUMINOUS COAL ENTERING
EACH CHANNEL OF DISTRIBUTION, 1915 AND 1929
 (Data in Table 5)



water routes. In Chart 8, tonnage shipments in 1929 are compared with those in 1915 for each of the following channels of distribution: all-rail, river, rail-lake, and rail-tidewater; and the volume sold to local trade or used at the mines (including that used for coking) is compared in the same way. Chart 9 is a special representation of coal shipments on the three rivers. The outstanding importance of the volume moving on the Monongahela may be seen at a glance; and it will be observed that a very great part of this moves only to Clairton—a great coking center.

Table 3
TONNAGE OF PENNSYLVANIA BITUMINOUS COAL ENTERING
EACH CHANNEL OF DISTRIBUTION, 1915-1934
(Thousands of Net Tons)

Year	Loaded at Mines for Shipment by Rail or River				Not Shipped by Rail or River			Total
	Railroad	River			Made into Coke at Mines	Sold to Local Trade ^a	Used at Mines for Power and Heat	
		Monon- gahela	Alle- gheny	Ohio				
1915	111,456 ^d	7,720 ^c	^d	^d	32,498	3,232	3,049	157,955
1916	115,532 ^d	7,650	^d	^d	39,526	4,212	3,375	170,295
1917	119,978	8,988	^d	^d	34,707	5,276	3,500	172,448
1918	128,518	8,975	^d	^d	32,460	4,984	3,613	178,551
1919	110,009	10,682	11 ^e	^d	21,607	5,141	3,306	150,758
1920	123,242	13,313	190	^d	24,054	6,300	3,509	170,608
1921	92,254	9,655	116	^d	7,121	4,316	2,552	116,014
1922	86,688	7,852	395	6	10,863	5,131	2,215	113,148
1923	123,006	14,526	733	10	23,738	7,359	2,507	171,880
1924	95,681	14,135	424	2	11,992	6,566	1,835	130,634
1925	98,436	15,532	485	3	13,370	7,585	1,517	136,928
1926	110,184	17,410	745	1	15,203	8,007	1,493	153,042
1927	99,768	16,011	246	1	8,445	7,177	1,317	132,965
1928	97,587	19,405	790	3	5,150	7,056	1,211	131,202
1929	105,001	21,125	938	1	7,308	8,048	1,096	143,516
1930	94,065	19,023	798	^d	2,753	6,881	944	124,463
1931	77,348	11,997	485	^d	1,272	5,816	739	97,659
1932	60,889	6,744	390	^d	777	5,319	657	74,776
1933	60,823	9,747 ^f	756	^d	1,039	6,264 ^g	666	79,296
1934	^b	^b	^b	^b	1,137	7,290 ^g	702	89,826

Source: *Mineral Resources of the United States, 1915-1931*; and *Statistical Appendix to Minerals Yearbook, 1932-1934*. Annual totals are based on exact figures, not on rounded numbers. The data do not include the output of wagon mines producing less than 1,000 tons each in 1921 or in any year since the beginning of 1924.

^a Includes that used by employees.

^b Includes an estimate of 34,500 tons for the Pittsburgh, Lisbon & Western Railroad.

^c Estimated traffic of 7,000 tons in West Virginia has been eliminated.

^d No loadings reported.

^e Reported as miscellaneous river tonnage for Pennsylvania.

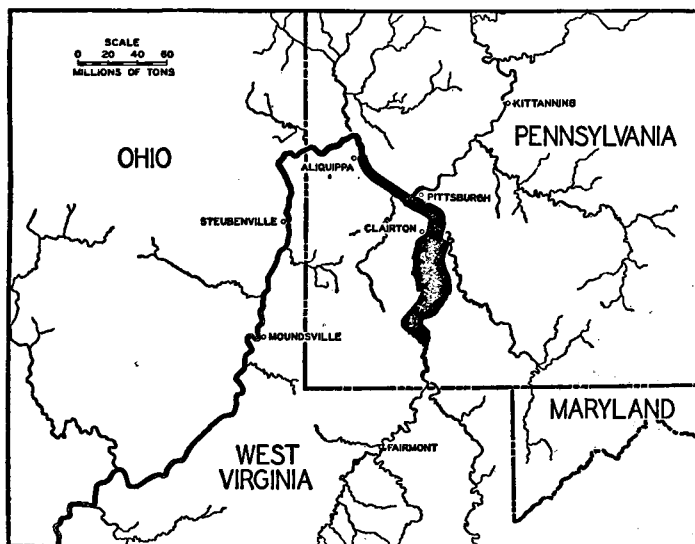
^f Includes 22,000 tons shipped on the Youghiogheny River.

^g Commercial sales by truck and wagon were 3,395,888 tons in 1933 and 4,493,554 tons in 1934.

^h Coal loaded at mines for shipment by rail and river in 1934 amounted to 80,696,259 tons. Separate figures for rail and river shipments are not available.

In 1933 the amount of coal loaded in Pennsylvania for shipment by railroad or by river was 89.9 per cent of the total production in the state. In 1929 the proportion was 88.5 per cent, and in 1915 it was 75.4 per cent. Originating railroads, however, lost traffic between 1915 and 1929, whereas river shipments almost trebled. The principal reason for the increase of river shipments was the shift from beehive coke making at the mines to by-product coke making along the banks of the rivers. This shift took place with amazing swiftness. In the short space of 14 years from 1915 to 1929 the annual amount of coal made into coke at the mines decreased from 32,498,000 tons to 7,308,000 tons, although 1929 was relatively a more active year in production generally than 1915. It will be observed from Table 3 that the decrease in coal used for coke making at the mines was not

Chart 9
SHIPMENTS OF COAL ON THE ALLEGHENY RIVER, THE
MONONGAHELA RIVER, AND THE UPPER PART OF
THE OHIO RIVER, 1929*
(Data in Table 3)



*Width of the shaded area at any point represents the density of traffic at that point as measured by the scale in the upper left hand corner of the map.

fully offset by the increase in river tonnage. Railroad tonnage of coal for the by-product coke industry increased considerably during the 14 years ending in 1929.¹⁵ Railroad shipments of coal exclusive of that shipped for by-product coke making declined severely.

The coal mines used only about one-third as much coal for their own power and heat in 1929 as in 1915. Although the mines may have economized on their own fuel, a more important reason for the decrease undoubtedly was the introduction of electrically driven machinery run by energy purchased from electric public utility plants.

It is impossible to determine accurately what change has taken place since 1915 in the volume of bituminous coal shipments by truck or wagon. There is clear evidence, however, that such shipments have increased considerably. Direct figures on these shipments are available only for 1933 and 1934. For the earlier years the tonnage moved by these means was included in "sold to local trade and used by employes."¹⁶ The truck and wagon shipments from Pennsylvania mines amounted to 3,395,888 tons in 1933 and to 4,493,554 tons in 1934. The total sales to local trade and use by employes (including all wagon and truck shipments) amounted to only 3,232,000 tons in 1915. Although total Pennsylvania production in 1934 was only slightly more than half as much as in 1915, truck and wagon shipments in 1934 exceeded by a large margin the grand total sold to local trade in 1915. Moreover, it is reasonable to assume that truck and wagon transportation was larger in the late twenties, when production and "local trade" were large, than it was in 1934.

The volume of trucking from the mines, however, is small in comparison with the volume of coal shipments by railroad. Less than 4.3 per cent of the bituminous coal produced in the state in 1933 was shipped from the mines by truck. On the other hand, originating railroads handled 76.7 per cent of the production in that year.

More detailed information on channels of distribution for Pennsylvania bituminous coal for 1915, 1917, 1918, and 1929 is shown in Table 4. The data in this table are given only in round

¹⁵ The shift in coke production will be treated more fully in Chapter 8.

¹⁶ In 1932 coal trucked 10 miles or more from the mine was reported. See the *Statistical Appendix to Minerals Yearbook, 1932-33*, p. 421.

numbers, owing to the fact that some of the figures are estimates, the principal adjustments of the original data being deductions to eliminate duplication and to exclude coal produced in fields outside Pennsylvania.

All-rail shipments of Pennsylvania bituminous coal increased 0.6 per cent from 1915 to 1929; river shipments increased 187.0 per cent; rail-lake shipments decreased 21.7 per cent; and rail-tidewater shipments decreased 32.9 per cent. Coal exclusive of that shipped by rail or water decreased 57.9 per cent from 1915

Table 4
DETAILED CHANNELS OF DISTRIBUTION FOR PENNSYLVANIA
BITUMINOUS COAL, 1915, 1917, 1918, and 1929
(Thousands of Net Tons; Recorded to the Nearest 100,000 Tons)

Channel of Distribution or Use	1915	1917	1918	1929
All-Rail Shipments, Total.....	87,000	96,900	102,700	87,500
To Pennsylvania Points.....	13,600	20,800	20,800	23,400
To U. S. Points Outside Pennsylvania.....	39,200	35,600	37,400	38,100
Railroad Fuel (Shipped by All-Rail) ^a	30,300	33,200	34,200	27,800
Rail Exports to Canada.....	3,900	7,300	7,800	3,200
River Shipments (To Pennsylvania, Ohio, and West Virginia).....	7,700	9,000	9,000	22,100
Rail-Lake Shipments, Total.....	10,600	8,400	8,700	8,300
Cargo—Domestic Railroad Fuel.....	3,400	2,100	2,000	1,500
Other Cargo—Domestic and Export.....	6,200	5,400	5,800	6,300
Vessel Fuel (Taken at Lower Lake Ports).....	1,000	900	900	500
Rail-Tidewater Shipments, Total.....	14,000	14,600	17,100	9,400
Cargo.....	8,100	9,900	11,700	6,800 ^d
Domestic.....	5,600 ^d	9,300	11,600	6,500 ^d
Export.....	2,500 ^d	600	100	300 ^d
Vessel Fuel (Excluding Fuel Taken in New England).....	5,900	4,700	5,400	2,600 ^d
Vessels engaged in Domestic Trade.....	1,100 ^d	1,500	2,500 ^e	1,500 ^d
Vessels engaged in Foreign Trade.....	4,800 ^d	3,200	2,900	1,100 ^d
Not Shipped by Rail or Water.....	38,700	43,500	41,100	16,300
Used at the Mines for Power and Heat.....	3,000	3,500	3,600	1,100
Made into Coke at the Mines.....	32,500	34,700	32,500	7,300
Sold to Local Trade and Used by Em- ployees ^f	3,200	5,300	5,000	7,900
Grand Total.....	158,000	172,400	178,600	143,500

Source: Data for this table have been gathered from various sources. The principal sources, however, are: (1) *Mineral Resources of the United States*; (2) *Supplement to Monthly Coal Distribution Report*, Numbers 3, 4, and 6; and (3) Ohio River Tonnage chart and tables for 1929, obtained from the U. S. Engineer's Office, Cincinnati, Ohio. Available information has been utilized to give the most reasonable indication for each item. The grand total in each year is equal to total production in the state.

^a Coal loaded into railroad cars at the mine and later transferred to boats for river shipment is classified with all-rail. See *Coal in 1929*, p. 781.

^b Revenue and non-revenue fuel.

^c Shipments from central Pennsylvania northward to Lake Ontario and across to Canada are included in rail exports. These shipments were not very large except in 1917 and 1918.

^d Estimate.

^e Includes a considerable amount for Army and Navy transport bunkers.

^f Includes a small tonnage taken by locomotives at the tippie.

to 1929. All-rail shipments to Pennsylvania points increased considerably, but all-rail shipments to points outside Pennsylvania (Canada as well as the United States) and all-rail shipments of fuel for railroads decreased. Shipments of coal for vessel fuel decreased tremendously, and so did exports of coal by way of tidewater ports. In general the data for 1917 and 1918 in comparison with those for 1929 give further evidence of these tendencies, but it must be remembered that the total tonnage in the War years was unusually large and that the War had considerable effect on the means of distribution as well as on the nature of the demand for the coal.

CHAPTER 3

Distribution of Bituminous Coal Mined in Pennsylvania

Bituminous coal mined in Pennsylvania is distributed in many sections of the United States, and some is exported to foreign countries. The main market, however, lies east of the Mississippi River and north of the southern boundaries of Illinois, Indiana, Ohio, Pennsylvania, and New Jersey. A large share of the state's production is shipped to points in the state; but a substantial portion is sent to New England, New York, New Jersey, and Ohio. Another considerable quantity is taken by railroads for their own use. Obviously, a great deal of the coal taken for railroad purposes is used within the state, but in the available

Chart 10
RELATIVE IMPORTANCE OF VARIOUS OUTLETS FOR
PENNSYLVANIA BITUMINOUS COAL IN 1929
(Data in Table 5)

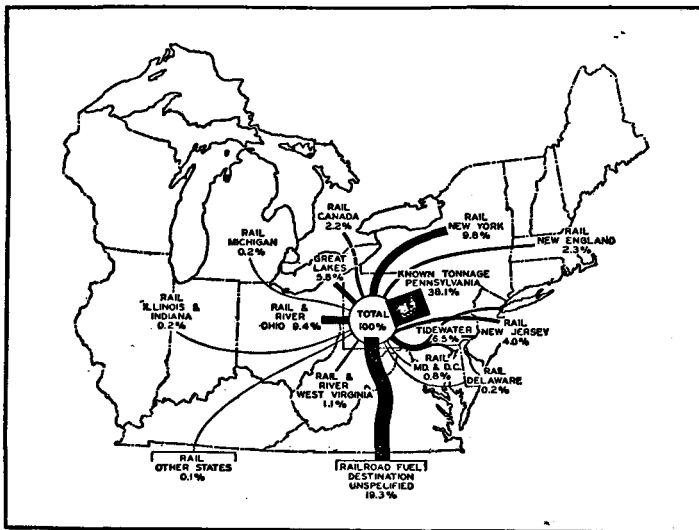


Table 5
DISTRIBUTION OF BITUMINOUS COAL PRODUCED IN
PENNSYLVANIA, ACCORDING TO DESTINATION OR USE,
1915 AND 1929^a

Destination or Use	Thousands of Net Tons		Per Cent of Annual Total		Ratio of 1929 Tonnage to 1915 Tonnage
	1915	1929	1915	1929	
Markets Known to be in Pennsylvania:			%	%	%
Used at Mines for Heat and Power	3,049	1,096	1.9	0.7	35.9
Sold to Local Trade	3,232	8,048	2.1	5.6	249.0
Made into Coke at Mines	32,498	7,308	20.6	5.1	22.5
Shipped by Rail or River to Pennsylvania Points	21,215	38,586	13.4	26.7	181.9
Total	59,994	55,038	38.0	38.1	91.7
Shipped by Rail or River to Other States:					
Delaware	951	343	0.6	0.2	36.1
Illinois-Indiana	2,532	338	1.6	0.2	13.3
Maryland and District of Columbia	1,514	1,138 ^b	1.0	0.8	75.2
Michigan	1,948	237	1.2	0.2	12.2
New England	6,588	3,291	4.2	2.3	50.0
New Jersey	3,490	5,798	2.2	4.0	166.1
New York	14,431	14,093	9.1	9.8	97.7
Ohio	6,188 ^c	13,557	4.6	9.4	219.1
Virginia	51	26	^d	^d	51.0
West Virginia	175	1,539	0.1	1.1	879.4
Wisconsin	143	6	0.1	^d	4.2
All Other States	1,200	120	0.8	0.1	10.0
Total	39,211	40,487^b	25.5	28.1	103.3
Not Classified by States:					
Railroad Fuel (Shipped by Rail)	30,295	27,810	19.2	19.3	91.8
Shipped to Great Lakes	10,629 ^f	8,298	6.1	5.8	78.1
Shipped to Tidewater	13,960	9,383	8.8	6.5	67.2
Exported by Rail	3,866	3,240	2.4	2.2	83.8
Total	58,750	48,731	36.5	33.8	82.9
Grand Total	157,955	144,256	100.0	100.0	91.3

Source: *Mineral Resources of the United States* (Part II), 1915, pp. 458 and 471, and *Supplement to Monthly Coal Distribution Report*, Numbers 4 and 6 (mimeographed, issued by the United States Bureau of Mines). Totals are based on exact figures, not on rounded numbers.

^a The data for 1915 cover the State of Pennsylvania. For 1929, the following districts have been combined: western Pennsylvania (excluding the Panhandle of West Virginia), central Pennsylvania, and Somerset-Meyersdale. Total reported distribution by these districts in 1929 exceeded by 740,000 tons the reported production for Pennsylvania. This difference was due to the inclusion of some coal from Maryland and probably also to a small amount of duplication in the figures. For 1929, mine fuel and local sales were reported by mine operators; shipments and railroad fuel, by originating railroads. For 1915, on the contrary, all the data were collected from operators, wholesalers, and brokers; the reported distribution in that year was equal to the reported production for the state.

^b Includes 4,990 tons produced in the Somerset-Meyersdale district and used in Maryland for power and heat at the mines or by local trade.

^c Vessel fuel amounting to 1,009,484 tons has been deducted.

^d Less than 0.05 per cent.

^e States south or west of Virginia, West Virginia, Ohio, Indiana, Illinois, and Wisconsin.

^f Includes 3,435,693 tons used for railroad fuel in the Northwest—total railroad fuel was 34,175,299 tons. Vessel fuel amounting to 1,009,484 tons has been added to the cargo coal to make the figure comparable with that of 1929.

Table 6
DISTRIBUTION OF BITUMINOUS COAL PRODUCED IN THE
PENNSYLVANIA AREA, ACCORDING TO MARKETS,
1917, 1918, AND 1929^a

Destination or Use	Thousands of Net Tons			Per Cent of Annual Total			Ratio of 1929 Tonnage to 1917 Tonnage
	1917	1918	1929	1917	1918	1929	
Markets Known to be in Pennsylvania:				%	%	%	%
Used at Mines for Power and Heat.....	3,500	3,613	1,096	1.9	1.9	0.7	31.3
Sold to Local Trade.....	5,276	4,984	8,048	2.9	2.6	5.1	152.5
Made into Coke at Mines	34,707	32,460	7,308	19.0	17.2	4.7	21.1
Shipped by Rail or River to Pennsylvania Points	32,635	33,745	39,899	17.9	17.9	25.5	122.3
Total.....	76,117	74,803	56,350	41.7	39.6	36.0	74.0
Markets Known to be in Maryland:							
Used at Mines for Power and Heat.....	59	56	11	d	d	d	18.6
Sold to Local Trade.....	105	98	120	0.1	0.1	0.1	114.3
Made into Coke at Mines	0	0	0	0.0	0.0	0.0	0.0
Shipped by Rail to Maryland Points.....	2,070	1,532	1,743	1.1	0.8	1.1	84.2
Total.....	2,234	1,686	1,874	1.2	0.9	1.2	83.9
Markets Known to be in West Virginia:							
Used at Mines for Power and Heat.....	89	86	87	d	d	0.1	97.8
Sold to Local Trade.....	815	994	1,393	0.4	0.5	0.9	170.9
Made into Coke at Mines	19	16	155	d	d	0.1	815.8
Shipped by Rail or River to West Virginia Points	1,017	1,176	1,882	0.6	0.6	1.2	185.1
Total.....	1,940	2,272	3,518	1.1	1.2	2.2	181.3
Shipped by Rail or River to Other States:							
Delaware.....	401	580	437	0.2	0.3	0.3	109.0
District of Columbia.....	478	875	193	0.3	0.5	0.1	40.4
Illinois and Indiana.....	260	320	371	0.1	0.2	0.2	142.7
Michigan.....	320	454	241	0.2	0.2	0.2	75.3
New England.....	7,929	8,298	3,518	4.3	4.4	2.2	44.4
New Jersey.....	4,988	5,216	6,531	2.7	2.8	4.2	130.9
New York.....	12,530	11,667	14,505	6.9	6.2	9.3	115.8
Ohio.....	9,392	10,566	14,458	5.2	5.6	9.2	153.9
West of the Mississippi.....	10	16	25	d	d	d	250.0
All Other States.....	234	290	167	0.1	0.2	0.1	71.4
Total.....	36,542	38,282	40,446	20.0	20.3	25.8	110.7
Markets Not Classified by States:							
Railroad Fuel Delivered by All-Rail Routes.....	32,341	34,810	30,939	17.7	18.4	19.8	95.7
Shipped to Great Lakes.....	8,675	9,040	9,122	4.8	4.8	5.8	105.2
Shipped to Tidewater.....	17,154	20,181	10,962	9.4	10.7	7.0	63.9
Exported by Rail.....	7,330	7,806	3,327	4.0	4.1	2.1	45.4
Total.....	65,499	71,837	54,350	35.9	38.0	34.7	83.0
Grand Total.....	182,333	188,880	156,537	100.0	100.0	100.0	85.9

Sources: *Supplement to Monthly Coal Distribution Report*, Number 4, November 20, 1931, and Number 6, January 20, 1932. *Mineral Resources of the United States* (Part II), 1917, p. 1207. Totals are based on exact figures, not on rounded numbers.

^a The Pennsylvania area includes the Panhandle of West Virginia and the Cumberland-Piedmont district in Maryland and West Virginia in addition to the western Pennsylvania, central Pennsylvania, and Somerset-Meyersdale districts in Pennsylvania.

^b Includes coal, if any, taken by tenders of locomotives at coal tipples. An unknown amount of this coal is included in both "local trade" and "railroad fuel."

^c To make the data for 1917 comparable with those for 1918 and 1929 estimated rail shipments of 55,000 tons to Erie, Pennsylvania and of 869,000 tons to Ohio lake port cities for fuel in lake vessels have been deducted from the all-rail shipments and added to the shipments to the Great Lakes. See Table 28. Exports to Canada by way of Lake Ontario are included in all-rail exports.

^d Less than 0.05 per cent.

^e Exports to Canada by way of Lake Ontario are included in all-rail exports.

data railroad coal cannot be segregated by states. The relative importance of the various outlets for Pennsylvania bituminous coal is shown in Chart 10.

Data on the distribution of coal produced in Pennsylvania in 1915 and in 1929 are shown in Table 5. The Bureau of Mines studies of distribution of coal for 1917 and 1918 did not follow state lines. To facilitate comparison of the data for these years with those for 1929 the western Pennsylvania district (including the Panhandle of West Virginia), the central Pennsylvania district, the Somerset-Meyersdale district, and the Cumberland-Piedmont district (along the Potomac River in Maryland and West Virginia) were combined to form what is herein called the Pennsylvania area.¹⁷ Distribution data for coal produced in the Pennsylvania area are shown in Table 6; for the individual districts (Cumberland-Piedmont being combined with Somerset-Meyersdale), in Tables 7-9.

The Market in Pennsylvania

That Pennsylvania early became a large producer of bituminous coal can be partially explained by the development of large-scale uses for coal within the state. In 1915 the tonnage of Pennsylvania coal shipped by rail or by river to points in Pennsylvania, that used at the mines, and that hauled by truck or wagon to points not far from the mine amounted altogether to 38.0 per cent of the state's production (Table 5). In 1929 the percentage known to be used within the state was almost identical with that in 1915.

(a) Coal Used at Mines for Power and Heat

In 1915 the bituminous coal mines of the state consumed 1.9 per cent of their production in generation of their own power and heat. By 1929 this percentage had declined to 0.7. Growth in the use of power generated by public utility concerns in central plants probably accounted almost completely for this decline. To the industry, coal used directly for mining purposes represents a cost of production rather than a market for coal, and the shift to purchased power changes the method of payment of this cost.

¹⁷ The Cumberland-Piedmont district is included because the data for it are inseparable from those of the Somerset-Meyersdale district for 1917 and 1918.

Table 7
DISTRIBUTION OF BITUMINOUS COAL PRODUCED IN THE
WESTERN PENNSYLVANIA-PANHANDLE DISTRICT,
ACCORDING TO MARKETS,
1917, 1918, AND 1929^a

Destination or Use	Thousands of Net Tons			Per Cent of Annual Total			Ratio of 1929 Tonnage to 1917 Tonnage
	1917	1918	1929	1917	1918	1929	
Markets Known to be in Pennsylvania:				%	%	%	%
Used at Mines for Power and Heat.....	2,130	2,237	752	1.9	2.0	0.8	35.3
Sold to Local Trade.....	2,790	3,038	3,917	2.5	2.7	4.0	140.4
Made into Coke at Mines	31,784	29,780	6,554	29.0	26.4	6.7	20.6
Shipped by Rail or River to Pennsylvania Points	23,737	24,338	31,444	21.7	21.5	32.1	132.5
Total.....	60,441	59,393	42,668	55.2	52.6	43.5	70.6
Markets Known to be in West Virginia:							
Used at Mines for Power and Heat.....	50	38	19	d	d	d	38.0
Sold to Local Trade.....	793	968	1,360	0.7	0.9	1.4	171.5
Made into Coke at Mines	0	0	0	0.0	0.0	0.0	-----
Shipped by Rail or River to West Virginia Points	900	1,054	1,783	0.8	0.9	1.8	198.1
Total.....	1,742	2,060	3,162	1.6	1.8	3.2	181.5
Shipped by Rail or River to Other States:							
Delaware.....	115	99	23	0.1	0.1	d	20.0
District of Columbia.....	0	0	3	0.0	0.0	d	-----
Illinois and Indiana.....	167	218	312	0.2	0.2	0.3	186.8
Maryland.....	174	176	171	0.2	0.2	0.2	98.3
Michigan.....	290	415	229	0.3	0.4	0.2	79.0
New England.....	1,743	1,387	352	1.6	1.2	0.4	20.2
New Jersey.....	2,258	2,312	892	2.1	2.0	0.9	39.5
New York.....	6,480	5,828	7,022	5.9	5.2	7.2	108.4
Ohio.....	8,981	10,297	14,052	8.2	9.1	14.3	156.5
Wisconsin.....	18	2	4	d	d	d	22.2
West of the Mississippi.....	0	0	0	0.0	0.0	0.0	-----
Virginia.....	0	0	e	0.0	0.0	d	-----
Miscellaneous.....	0	0	99	0.0	0.0	0.1	-----
Total.....	20,226	20,734	23,159	18.5	18.4	23.6	114.5
Markets Not Classified by States:							
Railroad Fuel Delivered by All-Rail Routes.....	12,754	15,860	17,009	11.7	14.0	17.3	133.4
Shipped to Great Lakes.....	8,428	9,028	8,939	7.7	8.0	9.1	106.1
Shipped to Tidewater.....	2,476	2,448	1,516	2.3	2.2	1.5	61.2
Exported by Rail.....	3,378	3,462	1,616	3.1	3.1	1.6	47.8
Total.....	27,036	30,798	29,081	24.7	27.3	29.7	107.6
Grand Total.....	109,445	112,984	98,070	100.0	100.0	100.0	89.6

Source: *Supplement to Monthly Coal Distribution Report*, Number 6, January 20, 1932 (mimeographed, issued by the United States Bureau of Mines). Totals are based on exact figures, not on rounded numbers.

^a The boundaries of the western Pennsylvania-Panhandle district in 1929 are not strictly comparable with the boundaries in 1917 and 1918. In 1917 and 1918 the Clarion, Low Grade Division, and Kittanning fields were included in western Pennsylvania and in 1929 they were included in central Pennsylvania.

^b Includes coal, if any, taken by tenders of locomotives at coal tipsles. An unknown amount of this coal is included in both "local sales" and "railroad fuel."

^c To make the data for 1917 comparable with those for 1918 and 1929, estimated rail shipments of 55,000 tons to Erie, Pennsylvania and of 869,000 tons to Ohio lake ports for vessel fuel have been deducted from the all-rail shipments (as reported by the Bureau of Mines) and added to the shipments to the Great Lakes. See Table 26.

^d Less than 0.05 per cent.

^e Less than 500 tons.

Mine use of coal decreased from 1917 to 1929 in all three of the districts in the Pennsylvania area. The decrease was 64.7 per cent in the western Pennsylvania-Panhandle district, 74.7 per cent in the central Pennsylvania district, and 57.7 per cent in

Table 8
DISTRIBUTION OF BITUMINOUS COAL PRODUCED IN THE
CENTRAL PENNSYLVANIA DISTRICT, ACCORDING TO
MARKETS, 1917, 1918, AND 1929^a

Destination or Use	Thousands of Net Tons			Per Cent of Annual Total			Ratio of 1929 Tonnage to 1917 Tonnage
	1917	1918	1929	1917	1918	1929	
Markets Known to be in Pennsylvania:				%	%	%	%
Used at Mines for Power and Heat.....	1,160	1,168	293	2.0	1.9	0.6	25.3
Sold to Local Trade ^b	2,239	1,744	4,014	3.8	2.8	8.9	179.3
Made into Coke at Mines	2,923	2,681	754	5.0	4.4	1.7	25.8
Shipped by Rail to Pennsylvania Points.....	6,583	6,689	6,231	11.1	10.9	13.8	94.7
Total.....	12,905	12,282	11,293	21.9	19.9	25.0	87.5
Shipped by Rail to Other States:							
Delaware.....	190	316	267	0.3	0.5	0.6	140.5
District of Columbia.....	30	20	25	0.1	^c	0.1	83.3
Illinois and Indiana.....	77	83	24	0.1	0.1	0.1	31.2
Maryland.....	104	22	258	0.2	^c	0.6	248.1
Michigan.....	25	24	6	^c	^c	^c	24.0
New England.....	5,847	6,801	2,215	9.9	11.0	4.9	37.9
New Jersey.....	1,951	2,052	4,389	3.3	3.3	9.7	225.0
New York.....	5,950	5,702	7,221	10.1	9.3	16.0	121.4
Ohio.....	175	106	226	0.3	0.2	0.5	129.1
West Virginia.....	0	0	^d	0.0	0.0	^e	—
West of the Mississippi.....	0	9	13	^f	^c	^c	—
All Other States.....	75	99	14	0.1	0.2	^e	18.7
Total.....	14,424	15,233	14,659	24.4	24.7	32.5	101.6
Markets Not Classified by States:							
Railroad Fuel Delivered by All-Rail Routes ^g	18,024	18,191	12,276	30.5	29.5	27.2	68.1
Shipped to Great Lakes.....	196	12	180	0.3	^e	0.4	91.8
Shipped to Tidewater.....	9,550	11,566	5,071	16.2	18.8	11.2	53.1
Exported by Rail.....	3,945	4,345	1,691	6.7	7.1	3.7	42.9
Total.....	31,714	34,114	19,217	53.7	55.4	42.5	60.6
Grand Total.....	59,044	61,629	45,169	100.0	100.0	100.0	76.5

Source: *Supplement to Monthly Coal Distribution Report*, Number 4, November 20, 1931 (mimeographed, issued by the United States Bureau of Mines). *Mineral Resources of United States* (Part II), 1917, p. 1207. Totals are based on exact figures, not on rounded numbers.

^a The boundaries of the central Pennsylvania district in 1929 are not strictly comparable with the boundaries in 1917 and 1918. In 1929 the Clarion, Low Grade Division, and Kittanning fields were included in central Pennsylvania and in 1917 and in 1918 they were included in western Pennsylvania.

^b Includes coal, if any, taken by tenders of locomotives at coal tipples. An unknown amount of this coal is included in both "local trade" and "railroad fuel."

^c Less than 0.05 per cent.

^d Less than 500 tons.

^e Exports to Canada by way of Lake Ontario in 1917 and in 1918 are included in "Exported by Rail."

Table 9
**DISTRIBUTION OF BITUMINOUS COAL PRODUCED IN THE
 SOMERSET-MEYERSDALE AND CUMBERLAND-PIEDMONT
 DISTRICTS, ACCORDING TO MARKETS,
 1917, 1918, AND 1929**

Destination or Use	Thousands of Net Tons			Per Cent of Annual Total			Ratio of 1929 Tonnage to 1917 Tonnage
	1917	1918	1929	1917	1918	1929	
Markets Known to be in Pennsylvania:				%	%	%	%
Used at Mines for Power and Heat.....	209	208	50	1.5	1.5	0.4	23.9
Sold to Local Trade.....	247	202	117	1.8	1.4	0.9	47.4
Made into Coke at Mines	0	0	0	0.0	0.0	0.0	
Shipped by Rail to Pennsylvania Points.....	2,315	2,719	2,223	16.7	19.1	16.7	96.0
Total.....	2,771	3,128	2,390	20.0	21.9	18.0	86.3
Markets Known to be in Maryland:							
Used at Mines for Power and Heat.....	59	56	11	0.4	0.4	0.1	18.6
Sold to Local Trade.....	105	98	120	0.8	0.7	0.9	114.3
Made into Coke at Mines	0	0	0	0.0	0.0	0.0	
Shipped by Rail to Maryland Points.....	1,792	1,334	1,313	12.9	9.4	9.9	73.3
Total.....	1,956	1,488	1,445	14.1	10.4	10.9	73.9
Markets Known to be in West Virginia:							
Used at Mines for Power and Heat.....	39	48	69	0.3	0.3	0.5	176.9
Sold to Local Trade.....	22	26	32	0.2	0.2	0.2	145.5
Made into Coke at Mines	19	16	155	0.1	0.1	1.2	815.8
Shipped by Rail to West Virginia Points.....	117	122	99	0.8	0.9	0.7	84.6
Total.....	198	212	355	1.4	1.5	2.7	179.3
Shipped by Rail to Other States:							
Delaware.....	96	165	146	0.7	1.2	1.1	152.1
District of Columbia.....	448	855	165	3.2	6.0	1.2	36.8
Illinois and Indiana.....	16	19	34	0.1	0.1	0.3	212.5
Michigan.....	5	15	6	♯	0.1	♯	120.0
New England.....	339	109	950	2.4	0.8	7.1	280.2
New Jersey.....	779	852	1,250	5.6	6.0	9.4	160.5
New York.....	100	137	262	0.7	1.0	2.0	262.0
Ohio.....	236	163	180	1.7	1.1	1.4	76.3
Virginia.....	41	43	40	0.3	0.3	0.3	97.6
West of the Mississippi.....	10	8	12	0.1	0.1	0.1	120.0
All Other States.....	100	148	11	0.7	1.0	0.1	11.0
Total.....	2,170	2,513	3,057	15.7	17.6	23.0	140.9
Markets Not Classified by States:							
Railroad Fuel Delivered by All-Rail Routes.....	1,563	759	1,653	11.3	5.3	12.4	105.8
Shipped to Great Lakes.....	51	0	3	0.4	0.0	♯	5.9
Shipped to Tidewater.....	5,128	6,167	4,375	37.0	43.2	32.9	85.3
Exported by Rail.....	7	20	20	0.1	♯	0.2	285.7
Total.....	6,749	6,926	6,051	48.8	48.5	45.5	89.7
Grand Total.....	13,843	14,267	13,298	100.0	100.0	100.0	96.1

Source: *Supplement to Monthly Coal Distribution Report*, Number 4, November 20, 1931 (mimeographed, issued by the United States Bureau of Mines). Totals are based on exact figures, not on rounded numbers.

♯ Includes coal, if any, taken by tenders of locomotives at coal tipples. An unknown amount of this coal is included in both "local trade" and "railroad fuel."

♯ Less than 0.05 per cent.

♯ Less than 500 tons.

the Somerset-Meyersdale and Cumberland-Piedmont districts (Tables 7-9).

(b) *Sales to Local Trade*

Local trade in coal includes shipments by truck or wagon from the mine to the retailer or directly to the consumer as well as coal taken by locomotives at the tippie. The trend of local trade is the reverse of the trend in mine use. In 1915, sales to local trade amounted to somewhat more than three million tons (Table 5). In 1929 this trade had increased to more than eight million tons. Local trade accounted for 2.1 per cent of production in 1915 and for 5.6 per cent in 1929.

The National Coal Association, in a release dated December 6, 1932, made the following statement about the trucking of coal from Pennsylvania mines:

"In the Pittsburgh territory of Pennsylvania it is reported that there has been a tremendous increase in the amount of trucking, and that much of this is coming from mines formerly shipping by rail. Six companies are shipping at least 100,000 tons of coal a month by truck. One correspondent states that mines not within trucking distance of Pittsburgh will soon lose all Pittsburgh trade. The distance over which the coal is trucked varies from 5 to 20 miles. Organized trucking concerns are now getting into the business. There are also 900 truckers, ordinarily engaged in other lines of work, that are now moving bituminous coal. In Altoona a few years ago most of the 200,000 tons of coal consumed in the town was brought in by rail. Today it nearly all comes in by truck. From mines in Somerset and Bedford Counties a considerable traffic in coal has been built up by truckers who have either taken a load of merchandise west and are returning light or are coming east light for a return load of fruit or other commodities. Most of this coal comes from mines not located on railroads. While the coal may not be as well prepared as that from railroad mines, the delivered price is so much below that of coal delivered by rail that it finds a ready market."

This shift in the means of transportation has not necessarily meant an increase in the amount of coal demanded by these markets. To some extent, trucking of coal has shifted the demand to mines without railroad connections. Trucking is probably a greater factor in the domestic market than in the industrial market. The statement quoted above from the National Coal Association applied to the situation in the latter part of 1932, but the figures in Table 5 indicate that the trend during the comparatively long period from 1915 to 1929 also was toward more direct mine-to-consumer deliveries. It should be observed, however, that deliveries by truck or wagon in 1929 were less than six per cent

of the state's production and were only one-fifth as large as shipments by railroad or river to Pennsylvania points.

(c) *Coal Made into Coke at the Mines*

Although production of coke at the mines does not represent final use of coal, a significant change in this classification requires attention. During the past 20 years, the amount of coal coked at mines has declined sharply. The rise of the by-product method of coke production has resulted in the transfer of a considerable portion of the coke industry to locations near markets for gas, coke, and other products of the industry. When no effort was made to save the by-products, it was the practice to ship coke from the mine rather than ship coal for coking purposes. In 1915 more than 20 per cent of the bituminous coal mined in Pennsylvania was made into coke at the mine, but in 1929 the percentage was only 5.1 (Table 5). The reduction in tonnage so used was from 32,498,000 tons in 1915 to 7,308,000 tons in 1929. Part of this loss was offset by the use of Pennsylvania coal at by-product plants within or outside the state.

(d) *Rail or River Shipments to Pennsylvania Points*

Shipments of Pennsylvania bituminous coal (exclusive of railroad and vessel fuel) by railroad or river to points within the state increased between 1915 and 1929, both in tonnage and in relation to total production (Table 5). These shipments amounted to 21,215,000 tons in 1915, or 13.4 per cent of the state's production in that year; but in 1929 they amounted to 38,586,000 tons, or 26.7 per cent of the entire tonnage mined within the state.

Probably the main reason for this increase is that a large amount of coal formerly made into coke at the mines is now being shipped to by-product ovens in the state. It seems likely that improved efficiency in the use of coal has tended against an increase in the growth of the aggregate industrial requirements of coal in the state. Data on shipments into the state from other states indicate that the Pennsylvania mines have not increased their share in the state's requirements (Table 10).

All the increase in rail or river shipments from mines in the Pennsylvania area to Pennsylvania points between 1917 and 1929 occurred in shipments originating in the western Pennsylvania-

Panhandle district, the increase in that district being from 23,737,000 tons to 31,444,000 tons. Central Pennsylvania shipments decreased from 6,583,000 tons in 1917 to 6,231,000 tons in 1929, and the Somerset-Meyersdale and Cumberland-Piedmont shipments fell from 2,315,000 tons to 2,223,000 tons during the same period (Tables 6-9).

Shipments by Rail or River to Markets outside the State

Aggregate tonnage of Pennsylvania coal (exclusive of railroad and vessel fuel) consigned by rail or river to out-of-state points was almost the same in 1929 as in 1915, the amount being close to 40,000,000 tons in each of the years. Most of this tonnage was for New England, New York, New Jersey, and Ohio. Although coal was sent by the Ohio River to Ohio and West Virginia, out-of-state consignments went predominantly by railroad.

New York took more Pennsylvania bituminous coal by rail than any other state in 1915 and in 1929, although New York was closely rivaled by Ohio in 1929. The shipments to New York decreased from 14,431,000 tons in 1915 to 14,093,000 tons in 1929, whereas the shipments to Ohio more than doubled, the increase being from 6,188,000 tons to 13,557,000 tons. New Jersey received more tonnage by rail in 1929 than in 1915. On the other hand, rail consignments to New England points declined substantially, total soft coal tonnage moved by rail to these points from Pennsylvania declining from 6,588,000 tons in 1915 to 3,291,000 tons in 1929. In a subsequent section of this chapter, it will be noted that Pennsylvania lost in shipments to tidewater; in Chapter 4, a gain in tidewater receipts in New England is shown, and it is pointed out that those receipts come mainly from fields competing with Pennsylvania. In other words, the loss in all-rail shipments from Pennsylvania to New England represented a loss of Pennsylvania markets to competing fields.

The most marked decline in rail shipments was in the long-haul tonnage moving westward. Railroad shipments to Michigan and to states south or west of Maryland, West Virginia, and Ohio in 1929 fell to about one-tenth as much as they were in 1915. The long-distance westward hauls from Pennsylvania had been

almost completely lost by the railroads; and, although the western markets were served increasingly by way of the Great Lakes, Pennsylvania not only failed to expand her tonnage to the lakes between 1915 and 1929 but actually suffered a loss of 2,331,000 tons.

The influence of freight rates may be seen roughly in the specialization in the direction of rail shipments of coal from the producing districts in the Pennsylvania area (Tables 7-9). Rail shipments from the central Pennsylvania district went largely to New England, New York, and New Jersey. Shipments from the Somerset-Meyersdale and Cumberland-Piedmont districts went mainly eastward to Maryland, New Jersey, and New England. The western Pennsylvania-Panhandle district shipped most of its coal westward. Freight rates, of course, are not proportional to distance, but, among Pennsylvania fields, the western fields have a rate advantage westward and the two districts lying farther east have a rate advantage eastward.

Railroad Fuel

Railroads provide the largest single market for Pennsylvania bituminous coal. Almost one-fifth of the state's production in 1929 was delivered by all-rail routes to railroads for consumption as fuel (Table 5). The proportion taken in 1915 was substantially the same, although the actual tonnage of the deliveries decreased 8.2 per cent from 1915 to 1929. The amount of this fuel coal was 30,295,000 tons in 1915, or 19.2 per cent of production, and 27,810,000 tons in 1929, or 19.3 per cent of production.

Figures for "non-revenue" fuel, that is, coal destined for use by the originating railroads, and for "revenue" fuel, that is, coal destined for use by railroads other than the originating railroads, are shown separately for 1929 in the distribution reports of the Bureau of Mines.¹⁸ Non-revenue railroad fuel in the Pennsylvania area (including the Panhandle of West Virginia as well as the Cumberland-Piedmont district in Maryland and West Virginia) was twice as large as revenue railroad fuel in 1929. This fact suggests that most of the railroad consumption of Pennsylvania coal was in Pennsylvania or in neighboring states through which the lines of the originating railroads extend.

¹⁸ Supplement to *Monthly Coal Distribution Report*, Numbers 1, 3, 4, and 6.

Railroad fuel delivered by all-rail routes is less important to the Somerset-Meyersdale and Cumberland-Piedmont districts than it is to the other districts in the Pennsylvania area, although its importance there was greater in 1929 than in 1917. Deliveries in the Somerset-Meyersdale and Cumberland-Piedmont districts for the use of railroads increased from 1,563,000 tons in 1917 to 1,653,000 tons in 1929 (Table 9). Western Pennsylvania-Panhandle district producers supplied 17,009,000 tons of coal, or 17.3 per cent of their production, directly by rail to railroads in 1929; in 1917 they supplied 12,754,000 tons, or 11.7 per cent of their production (Table 7). Railroads took a large volume of the coal mined in the central Pennsylvania district. Such deliveries from that district amounted to 18,024,000 tons, or 30.5 per cent of production in 1917; the amount was reduced to 12,276,000 tons, or 27.2 per cent of output in 1929 (Table 8). These figures indicate a shift in the consumption of railroad fuel. Railroads were taking less of the medium- and low-volatile coal of central Pennsylvania and more of the high-volatile coal of western Pennsylvania.

Shipments to the Great Lakes

The Great Lakes provide an important outlet for Pennsylvania coal. In 1929 more than eight million tons of Pennsylvania bituminous coal were shipped to ports on Lake Erie and Lake Ontario (Table 5). In part this coal was for vessel fuel; in part it was shipped in vessels as cargo to American and Canadian ports on the lakes (car-ferry shipments are counted as rail shipments).

Shipments to lake ports totaled 2,331,000 tons less in 1929 than they were in 1915. Lake shipments were 6.1 per cent of the total Pennsylvania production in 1915, but they were only 5.8 per cent in 1929.

The bulk of the lake shipments from the Pennsylvania area in 1929 (98 per cent) originated in the western Pennsylvania-Panhandle district (Tables 7-9). Nearly all the remainder was from the central Pennsylvania district. The tonnage originating in the Somerset-Meyersdale and Cumberland-Piedmont districts was negligible.

Each winter, shipments to the lakes are suspended, but the lake outlet is an important sustaining factor to mine operations in western Pennsylvania during the other seasons of the year.

Shipments to Tidewater

Shipments from Pennsylvania bituminous coal fields to Atlantic tidewater ports in 1929 amounted to 9,383,000 tons (Table 5). The tonnage was somewhat more important than that shipped to the Great Lakes. The tidewater consignments went to New York, Philadelphia, and Baltimore. Part of this tonnage was used as vessel fuel; part was exported; and part was transported on ships to be used near the loading point or at more distant Atlantic points, especially in New England. The destination of tidewater shipments from Pennsylvania will be given fuller consideration in Chapter 6.

Shipments to tidewater from mines in Pennsylvania have declined markedly. In 1915 they were 8.8 per cent of the state's bituminous coal production, whereas they amounted to only 6.5 per cent in 1929 (Table 5).

The tidewater business in 1929 accounted for almost a third of the production in the Somerset-Meyersdale and Cumberland-Piedmont districts but for only 1.5 per cent of the western Pennsylvania and West Virginia Panhandle production (Tables 7 and 9). Tidewater shipments were important to central Pennsylvania producers in 1918, comprising 18.8 per cent of total production in that district in that year; but by 1929 they represented only 11.2 per cent of production (Table 8).

Exports by Rail

Railroads carry a considerable tonnage of coal to Canada from the Appalachian fields (movement by car ferry across Lake Erie and Lake Ontario is counted among the all-rail exports).¹⁹ Rail exports of bituminous coal from Pennsylvania declined 16.2 per cent from 1915 to 1929 (Table 5). In 1915 they were 3,866,000 tons, or 2.4 per cent of Pennsylvania production; and in 1929 they were 3,240,000 tons, or 2.2 per cent of the production. The central Pennsylvania district and the western Pennsylvania-Panhandle district share about equally in the all-rail

¹⁹ *Coal in 1929*. p. 790.

export market (Tables 7 and 8). Exports by rail are not an appreciable part of the production in the Somerset-Meyersdale and Cumberland-Piedmont districts (Table 9).

Summary

In the period from 1915 to 1929, there were important shifts in the markets for Pennsylvania bituminous coal. The most notable change was the reduction in the amount of coal made into coke at the mines. Increases in shipments to by-product ovens, including those outside the state, partially compensated for this reduction. Railroad fuel shipped by all-rail routes in 1929 was approximately the same percentage of the state's total production as that in 1915. Data for 1917 and 1929 indicate that central Pennsylvania fields suffered a heavy loss and that the western Pennsylvania fields enjoyed a considerable gain.

Railroad shipments to New England were half as much in 1929 as in 1915. The rail shipments to New York state decreased slightly, but those to New Jersey increased 66.1 per cent, and those to Ohio more than doubled. The long-haul rail shipments to states west of Ohio had dwindled by 1929 to a small fraction of their importance in 1915. Shipments to the Great Lakes diminished, and so did shipments to tidewater. All-rail exports to Canada also decreased.

Pennsylvania users, including by-product coke plants but excluding railroads and vessels, took 38.1 per cent of the state's bituminous coal production in 1929. Railroads took by all-rail routes, for their own use, 19.3 per cent additional; a considerable portion of this coal was probably used in the state. It is apparent, therefore, that the state provided the largest market for its own coal and that the future of the state's industries in general will have an important bearing on the future of its coal industry.

CHAPTER 4

Bituminous Coal Receipts in Major Consuming Areas, with Special Reference to Receipts by All-Rail Routes from Pennsylvania

In the preceding chapter, the discussion dealt with the important market areas for Pennsylvania coal and with the changes that have occurred in the comparative importance of those areas from the point of view of Pennsylvania producers. Attention is now turned to (a) changes that have occurred in the amount of coal used in the various markets, (b) Pennsylvania's share in each of the markets, and (c) changes that have occurred in that share. Since shipments for railroad fuel and vessel fuel cannot be traced to destination, coal in these classifications cannot be dealt with in terms of specific consuming areas.

In the distribution data for 1929, the Bureau of Mines showed for each mining district the amount of coal used in the vicinity of the mines and the amount shipped to markets away from the mines. Destinations were given for shipments by all-rail, river, truck or wagon from the mines, and for coal consumed at the mines. For this study, the shipments for which the Bureau of Mines showed destination have been reclassified to show for each destination area the source of coal received. For each destination area, there were added imports of coal and receipts of domestic (United States) coal by way of the Great Lakes and by way of tidewater; in the available data, imports and domestic receipts by the Great Lakes and by tidewater, however, cannot be classified by originating fields. Data for 1917 and 1918 were reclassified and supplemented in this way by the Bureau of Mines.²⁰ Data for individual mining districts in the Pennsylvania area are shown in this chapter; but mining districts outside the Pennsylvania area were grouped into relatively large areas, so that the amount of tabular material might be reduced and comparisons facilitated.²¹

²⁰ *Mineral Resources of the United States (Part II)*, 1917, pp. 1255-1259 and 1918, pp. 1367-1371.

²¹ For a description of the areas, refer to Chart 2 and section entitled "Areas Covered," in the Introduction.

The annual data on the distribution of coal do not directly measure annual consumption, although they relate so closely to consumption that for practical purposes they may be considered to indicate the amount of coal actually used. Bureau of Mines data on rail shipments of bituminous coal are adjusted for most of the reconsignments. The receipts shown for any area, therefore, closely approximate receipts by coal consumers in that area. Annual receipts, of course, differ from annual consumption in so far as stocks of coal are increased or decreased during the year. Moreover, receipts by tidewater or by the Great Lakes cannot be accurately allocated according to originating areas. In spite of these qualifications, however, data presented in this chapter indicate substantially what part of the coal received in each consuming market is obtained from each of the producing areas.

In dealing with Pennsylvania's share in the markets for coal, attention will be given only to those markets which received a considerable amount of bituminous coal by rail or by river from Pennsylvania mines or which received a considerable tonnage by lake or by Atlantic tidewater. Bituminous coal deliveries to the following states are covered: Pennsylvania, New York, New Jersey, New England states (as a group), Ohio, Michigan, and Illinois and Indiana combined. It should be borne in mind throughout this chapter that railroad fuel and vessel fuel are not considered, because neither could be identified with single consuming states. Consumption by railroads and by vessels is given separate treatment in Chapter 8.

For coal-producing states, the data on coal by origin include not only receipts by rail or by river but also coal used at mines for power and heat, coal made into coke at the mines, and coal sold to local trade, that is, shipped by truck or wagon or taken by locomotive tenders at the tipple.

A general summary for 1915 and for 1929 of the origins of bituminous coal received for consumption (excluding railroad fuel, vessel fuel, imports, and receipts by tidewater) in north-eastern and north central states of the country is shown in Table 10. Coal delivered from the producing state by rail or river is classified according to state of origin. All truck and wagon shipments from the mines are included as consumption in the producing state, although it is recognized that part of these ship-

Table 10
BITUMINOUS COAL SHIPPED BY RAIL, RIVER, OR LAKE FOR CONSUMPTION IN SPECIFIED STATES
(EXCLUSIVE OF RAILROAD AND VESSEL FUEL AND COAL SHIPPED BY TIDEWATER)
ACCORDING TO ORIGIN, 1915 AND 1929
(Thousands of Net Tons)

Producing State or Area	Consuming State or Area								
	New England	New York	New Jersey	Pennsylvania	Ohio ^e	Michigan	Illinois and Indiana	Wisconsin	Minnesota
1915									
Pennsylvania.....	6,588	14,431	3,490	59,994	6,188	1,948	2,532	143	120
Ohio.....	0	115	0	17	9,447	1,454	638	10	65
Maryland.....	630	567 ^b	34	506	37	48	28	0	0
West Virginia.....	20	2,073	646	4,945	5,152	4,326	9,151	839	41
Kentucky.....	0	0	0	79 ^c	1,348	1,062	3,751	380	345
Tennessee.....	0	0	0	0	24	^d	23	0	0
Illinois-Indiana.....	0	0	0	0	3	89	38,046	1,388	1,407
Other States.....	0	0	0	0	169	790 ^e	290 ^f	9	65
Origin Unknown (Delivered by Lake).....	0	0	0	0	0	558	1,635	4,883	3,793
Total.....	7,238	17,186	4,170	65,541	22,368	10,275	56,094 ^f	7,652	5,836
1929									
Pennsylvania.....	3,291	14,093	5,798	55,038	13,557	237	338	6	1 ^g
Ohio.....	0	543	0	37	10,428	751	174	1	0
Maryland.....	227	99	733	1,127	5	4	33	4	3
West Virginia.....	355	2,609	989	5,413	18,990	11,753	19,068	838	283
Kentucky.....	^h	29	0	20	4,957	6,098	11,717	582	350
Tennessee.....	0	0	0	0	319	374	397	5	12
Illinois-Indiana.....	0	0	0	0	0	84	39,960	1,156	807
Other States.....	1	1	ⁱ	5	439	708	332	22	199
Origin Unknown (Delivered by Lake).....	0	2,257	0	42	359	5,798	5,368	7,203	6,843
Total.....	3,874	19,631	7,520	61,682	49,054	25,807	77,387	9,817	8,498

Source: *Mineral Resources of the United States* (Part II), 1915, pp. 488-492. *Supplement to Monthly Coal Distribution Report*, Numbers 1, 3, 4, and 6 (mimeographed, issued by the United States Bureau of Mines).

^a Vessel fuel taken at Lake Erie ports has been subtracted from the Ohio figures for 1915 to make them comparable with those for 1929.

^b Includes a small quantity of coal from Maryland exported by rail to Canada.

^c Includes coal from Kentucky exported by rail to Canada.

^d Less than 500 tons.

^e 761,217 tons were from Michigan.

^f Does not include coal from Missouri amounting to less than 1,888 tons.

^g Central Pennsylvania, western Pennsylvania (excluding the Panhandle of West Virginia), and Somerset-Meyersdale districts.

^h There may be a small additional tonnage among unspecified states.

ⁱ Cumberland-Piedmont district.

^j Panhandle, northern West Virginia, New River-Winding Gulf, Pocahontas-Tug River, Kanawha, Logan, and Kenova-Thacker districts.

^k Western Kentucky, northeastern Kentucky, McRoberts, Hazard, and Harlan-Benham districts.

^l Southeastern Kentucky, Tennessee, and Georgia districts. Almost all the production is in Tennessee.

^m Includes only states for which the tonnage is known.

RECEIPTS IN MAJOR AREAS

ments cross state lines. In addition, consumption in the producing state includes coal used at mines in the state for power and heat and coal coked at mines. Coking at the mines, of course, is not final consumption, except that roughly one-third of the coal with which the ovens are charged is consumed in the coking process. The coke recovered, equivalent to roughly two-thirds of the oven charge, is shipped, much of it crossing state lines. (Shipments and consumption of coke are considered in Chapter 8.)

Sources of Bituminous Coal Consumed in Pennsylvania

Bituminous coal destined for consumption in Pennsylvania (exclusive of railroad and vessel fuel) amounted to 63,863,000 tons in 1929 (Table 11). In 1917 the aggregate was 80,028,000 tons. An exact statement of how much came from Pennsylvania mines cannot be made, for the source classifications in the available data necessitate the use of the "Pennsylvania area," which includes mining fields outside the state.

Of the total received in Pennsylvania, mines in the Pennsylvania area produced 95.1 per cent in 1917, 93.6 per cent in 1918, and 88.2 per cent in 1929. The tonnage supplied to the state by the mines in the Pennsylvania area declined from 76,117,000 tons in 1917 to 74,803,000 tons in 1918 and to 56,350,000 tons in 1929. Each of the three producing districts in the area supplied less tonnage in 1929 than in 1917. The decline suffered by the central Pennsylvania district was relatively less than the decline in the total, the percentage for this district increasing. The decline in the combined Somerset-Meyersdale and Cumberland-Piedmont districts was also relatively less than the decline in the total. The western Pennsylvania-Panhandle district supplied to the state market 17,773,000 tons less in 1929 than in 1917, the decline being relatively greater than the decline in the total supplied by the Pennsylvania area.

There was a substantial increase in the amount of coal supplied to Pennsylvania by the northern West Virginia district. In 1929 that district supplied 7.4 per cent of the Pennsylvania total, whereas it supplied only 3.2 per cent in 1917. Rail shipments from other states were not large in either 1917, 1918, or 1929.

Table 11
**BITUMINOUS COAL DESTINED FOR CONSUMPTION IN
 PENNSYLVANIA (EXCLUSIVE OF RAILROAD AND VESSEL FUEL)
 ACCORDING TO ORIGIN, 1917, 1918, AND 1929**

Origin	Thousands of Net Tons			Per Cent of Annual Total			Ratio of 1929 Tonnage to 1917 Tonnage
	1917	1918	1929	1917	1918	1929	
Classified by Originating Areas:				%	%	%	%
Pennsylvania Area:							
Central Pennsylvania..	12,905	12,282	11,293	16.1	15.4	17.7	87.5
Western Pennsylvania- Panhandle.....	60,441 ^b	59,393	42,668	75.5	74.3	66.8	70.6
Somerset-Meyersdale and Cumberland- Piedmont.....	2,771	3,128	2,390	3.5	3.9	3.7	86.3
Total.....	76,117 ^b	74,803	56,350	95.1	93.6	88.2	74.0
Ohio Area.....	129 ^b	67	37	0.2	0.1	0.1	28.7
Northern West Virginia Area.....	2,553	3,312	4,741	3.2	4.1	7.4	185.7
Southern West Virginia Area.....	250	322	486	0.3	0.4	0.8	194.4
Eastern Kentucky-Ten- nessee Area.....	0	21	20	0.0	c	c	-----
Virginia Area.....	0	0	4	0.0	0.0	c	-----
Alabama Area.....	0	0	d	0.0	0.0	c	-----
Not Classified by Originating Areas:							
Tidewater.....	977	1,367	2,182	1.2	1.7	3.4	223.3
Lake Docks.....	0	0	42	0.0	0.0	0.1	-----
Imports.....	1	1	0	c	c	0.0	-----
Grand Total.....	80,028^b	79,893	63,863	100.0	100.0	100.0	79.8

Source: *Supplement to Monthly Coal Distribution Report*, Numbers 3, 4, and 6 (mimeographed, issued by the United States Bureau of Mines). *Mineral Resources of the United States* (Part II), 1917, p. 1258, and 1918, p. 1370. Data on imports and tidewater receipts in 1929 were obtained by letter from the United States Bureau of Mines. Totals are based on exact figures, not on rounded numbers.

^a For the Pennsylvania coal fields, the tonnages consist of coal used at mines for power and heat, coal sold to local trade, coal made into coke at the mines, and coal shipped by rail or river to Pennsylvania points; for all other coal fields, coal shipped by rail or river to Pennsylvania. The areas are described in the Introduction.

^b In order to make the data for 1917 comparable with those for 1918 and 1929, the following estimated shipments of coal to Erie, Pennsylvania for use as vessel fuel have been deducted: 55,000 tons from the western Pennsylvania-Panhandle district and 31,000 tons from the Ohio Area. See Table 26.

^c Less than 0.05 per cent.

^d Less than 500 tons.

Tidewater receipts accounted for an increasing proportion of the bituminous coal received in the state, amounting to 1.2 per cent of the state total in 1917, 1.7 per cent in 1918, and 3.4 per cent in 1929. This tidewater coal undoubtedly was composed almost entirely of coal loaded at Hampton Roads and originating in Virginia, West Virginia, and eastern Kentucky, since the coal originating in northern fields could reach most, if not all, Penn-

sylvania points cheaper by an all-rail route than by a rail-tide-water route.

It is evident, therefore, that producers in the Pennsylvania area, although retaining a dominant position in the Pennsylvania market for bituminous coal, have lost part of that market to other areas. Some of the loss was to nearby mines in northern West Virginia, but part of it was to mines in the southern Appalachian fields a considerable distance from the state.

Sources of Bituminous Coal Consumed in New York

All coal used in New York state must be obtained outside the state. Exclusive of railroad and vessel fuel, 27,986,000 tons of bituminous coal were received in New York state in 1929 (Table 12). This amount compares with 19,694,000 tons in 1917 and with 20,467,000 in 1918. It is apparent, therefore, that the state was a growing market for soft coal.

The Pennsylvania coal fields being the nearest fields to New York, it is not surprising that a large proportion of the coal used in that state comes from Pennsylvania mines. That proportion, however, has declined. Of the total bituminous coal received in New York state, except railroad and vessel fuel, 63.6 per cent came by rail from the Pennsylvania area in 1917 and 57.0 per cent in 1918; but in 1929 only 51.8 per cent was received by rail from the area. Although Pennsylvania area coal received by rail fell as a percentage of New York receipts, the actual amounts shipped increased substantially.

Central Pennsylvania rail shipments lost in percentage in the New York market from 1917 to 1929, but they increased in tonnage, the gain being 1,271,000 tons. In 1917, 30.2 per cent of all the coal received in New York came by rail from central Pennsylvania, whereas in 1929 only 25.8 per cent came from that district.

Western Pennsylvania supplied 6,480,000 tons by rail, or 32.9 per cent of the shipments to New York in 1917; in 1929, although shipments from western Pennsylvania had increased to 7,022,000 tons, the amount constituted only 25.1 per cent of New York state's receipts.

Rail shipments to New York from the Somerset-Meyersdale and Cumberland-Piedmont districts in 1929 were 162.0 per cent

Table 12
 BITUMINOUS COAL DESTINED FOR CONSUMPTION IN NEW YORK (EXCLUSIVE OF RAILROAD AND VESSEL FUEL), ACCORDING TO ORIGIN, 1917, 1918, AND 1929

Origin	Thousands of Net Tons			Per Cent of Annual Total			Ratio of 1929 Tonnage to 1917 Tonnage
	1917	1918	1929	1917	1918	1929	
Classified by Originating Areas:				%	%	%	%
Pennsylvania Area:							
Central Pennsylvania..	5,950	5,702	7,221	30.2	27.9	25.8	121.4
Western Pennsylvania-Panhandle.....	6,480	5,828	7,022	32.9	28.5	25.1	108.4
Somerset-Meyersdale and Cumberland-Piedmont.....	100	137	262	0.5	0.7	0.9	262.0
Total.....	12,530	11,667	14,505	63.6	57.0	51.8	115.8
Ohio Area.....	350	374	543	1.8	1.8	1.9	155.1
Northern West Virginia Area.....	358	424	2,223	1.8	2.1	7.9	620.9
Southern West Virginia Area.....	3	0	74	b	0.0	0.3	2466.7
Eastern Kentucky-Tennessee Area.....	0	3	29	0.0	b	0.1	-----
Virginia Area.....	0	0	1	0.0	0.0	b	-----
Not Classified by Originating Areas:							
Tidewater.....	6,295	7,918	8,350	32.0	38.7	29.8	132.6
Great Lakes.....	155	65	2,257	0.8	0.3	8.1	145.6
Imports.....	3	16	4	b	0.1	b	133.3
Grand Total.....	19,694	20,467	27,986	100.0	100.0	100.0	142.1

Source: *Supplement to Monthly Coal Distribution Report*, Numbers 3, 4, and 6 (mimeographed, issued by the United States Bureau of Mines). *Mineral Resources of the United States* (Part II), 1917, p. 1258, 1918, p. 1368. Data on imports and tidewater receipts in 1929 were obtained by letter from the United States Bureau of Mines. Totals are based on exact figures, not on rounded numbers.

a Shipped by all-rail from the areas specified. The areas are described in the Introduction.

b Less than 0.05 per cent.

greater than in 1917, but even the 1929 tonnage from these districts constituted less than one per cent of the coal shipped to the state.

Direct rail shipments from the northern West Virginia district increased by 1,865,000 tons from 1917 to 1929. In the latter year, 7.9 per cent of the New York coal came by rail from West Virginia; the percentage was only 1.8 in 1917. Rail shipments from Ohio mines, though still a small part of the market, increased in both amount and percentage between 1917 and 1929.

Coal received in New York state by way of tidewater ports amounted to 6,295,000 tons in 1917, 7,918,000 tons in 1918, and 8,350,000 tons in 1929. Such coal supplied 32 per cent of the

New York market in 1917, 38.7 per cent in 1918, and 29.8 per cent in 1929. This tonnage cannot be classified according to originating area. It may be noted, however, that the Pennsylvania area originated 45.9 per cent of all shipments to tidewater in the United States in 1917 but only 31.2 per cent in 1929. The major competitor, the southern West Virginia area, originated 45.1 per cent of total tidewater shipments in 1917 and 55.8 per cent in 1929 (Table 32).

A notable increase occurred in the amount of bituminous coal received in western New York by the lake route. In 1917, only 155,000 tons were received by lake, but 2,257,000 tons came by that route in 1929 (Table 12). This tonnage in 1929 amounted to 8.1 per cent of the total soft coal used in the state in that year. About half the lake shipments in 1929 to all destinations, including those outside New York, came from West Virginia, and less than one-fourth came from Pennsylvania (Table 24). Eastern Kentucky and Ohio together supplied about one-fourth the tonnage.

Sources of Bituminous Coal Consumed in New Jersey

New Jersey is another state with a growing market for bituminous coal. Total coal received in New Jersey (excluding railroad and vessel fuel) was 6,858,000 tons in 1917, 6,960,000 tons in 1918, and 9,805,000 tons in 1929 (Table 13). Receipts by rail from the Pennsylvania area increased from a little less than 5,000,000 tons in 1917 to 6,531,000 tons in 1929. This increase, however, was not as great relatively as the growth in the New Jersey market, and the percentage supplied by the mines in the Pennsylvania area was lower in 1929 than in 1917.

The western Pennsylvania-Panhandle district suffered a heavy decline in rail shipments to New Jersey. The total from that district was only 892,000 tons in 1929, although the aggregate was 2,258,000 tons in 1917 and 2,312,000 tons in 1918. Central Pennsylvania rail shipments, on the other hand, increased sharply in the New Jersey market. In 1929, central Pennsylvania shipped by rail 4,389,000 tons to New Jersey, or 44.8 per cent of the total received in that state; in 1917 only 1,951,000 tons, or 28.4 per cent of the total, came by rail routes from the central Pennsylvania district. The Somerset-Meyers-

Table 13
 BITUMINOUS COAL DESTINED FOR CONSUMPTION IN NEW
 JERSEY (EXCLUSIVE OF RAILROAD AND VESSEL FUEL),
 ACCORDING TO ORIGIN, 1917, 1918, AND 1929

Origin	Thousands of Net Tons			Per Cent of Annual Total			Ratio of 1929 Tonnage to 1917 Tonnage
	1917	1918	1929	1917	1918	1929	
Classified by Originating Areas:^a				%	%	%	%
Pennsylvania Area:							
Central Pennsylvania-Panhandle.....	1,951	2,052	4,389	28.4	29.5	44.8	225.0
Western Pennsylvania-Somerset-Meyersdale and Cumberland-Piedmont.....	2,258	2,312	892	32.9	33.2	9.1	39.5
Total.....	4,988	5,216	6,531	72.7	74.9	66.6	160.5
Northern West Virginia Area.....	750	850	911	10.9	12.2	9.3	121.5
Southern West Virginia Area.....	25	66	78	0.4	1.0	0.8	312.0
Eastern Kentucky-Tennessee Area.....	0	1	0	0.0	b	0.0	-----
Virginia Area.....	0	0	c	0.0	0.0	b	-----
Not Classified by Originating Areas:							
Tidewater.....	1,095	827	2,286	16.0	11.9	23.3	208.8
Grand Total.....	6,858	6,960	9,805	100.0	100.0	100.0	143.0

Source: *Supplement to Monthly Coal Distribution Report*, Numbers 3, 4, and 6 (mimeographed, issued by the United States Bureau of Mines). *Mineral Resources of the United States* (Part II), 1917, p. 1258, and 1918, p. 1369. Data on imports and tidewater receipts in 1929 were obtained by letter from the United States Bureau of Mines. Totals are based on exact figures, not on rounded numbers.

^a Shipped by all-rail from the areas specified. The areas are described in the Introduction.

^b Less than 0.05 per cent.

^c Less than 500 tons.

dale and the Cumberland-Piedmont districts shipped more coal by rail to New Jersey in 1929 than in 1917 or in 1918; their percentage of the total also increased.

The northern West Virginia district was the only other producing district shipping a considerable amount of coal to New Jersey by rail. The tonnage from that district increased from 1917 to 1929, but the percentage share of the district declined.

The large increase in tidewater receipts in New Jersey probably reflected greater consumption of coal from the fields shipping heavily to Hampton Roads, namely, Virginia, southern West Virginia, and eastern Kentucky. Tidewater coal accounted for 16.0 per cent of all coal receipts in New Jersey in 1917, 11.9 per cent in 1918, and 23.3 per cent in 1929.

**Sources of Bituminous Coal Consumed in the
New England States**

Total receipts of bituminous coal at New England points decreased slightly from 1917 to 1929 (Table 14). In 1917 New England took 17,080,000 tons of bituminous coal, 46.4 per cent of which came from the Pennsylvania area by all-rail routes. Of the 16,634,000 tons received in New England in 1929, only 21.1 per cent came from the Pennsylvania area by all-rail routes. The decline in both tonnage and percentage supplied by rail from the Pennsylvania area between 1917 and 1929 was severe.

In 1917 and 1918 the New England market was especially important to the central Pennsylvania fields, rail receipts from that district in 1917 being 5,847,000 tons, or 34.2 per cent of

**Table 14
BITUMINOUS COAL DESTINED FOR CONSUMPTION IN NEW
ENGLAND (EXCLUSIVE OF RAILROAD AND VESSEL FUEL),
ACCORDING TO ORIGIN, 1917, 1918, AND 1929**

Origin	Thousands of Net Tons			Per Cent of Annual Total			Ratio of 1929 Tonnage to 1917 Tonnage
	1917	1918	1929	1917	1918	1929	
Classified by Originating Areas:				%	%	%	%
Pennsylvania Area:							
Central Pennsylvania..	5,847	6,801	2,215	34.2	32.6	13.3	37.9
Western Pennsylvania-Panhandle.....	1,743	1,387	352	10.2	6.7	2.1	20.2
Somerset-Meyersdale and Cumberland-Piedmont.....	339	109	950	2.0	0.5	5.7	280.2
Total.....	7,929	8,298	3,518	46.4	39.8	21.1	44.4
Northern West Virginia Area.....	81	99	291	0.5	0.5	1.7	359.3
Southern West Virginia Area.....	0	0	64	0.0	0.0	0.4	-----
Eastern Kentucky-Tennessee Area.....	0	b	b	0.0	c	c	-----
Virginia Area.....	0	0	1	0.0	0.0	c	-----
Not Classified by Originating Areas:							
Tidewater.....	8,950	12,254	12,714	52.4	58.8	76.4	142.1
Imports.....	120	185	46	0.7	0.9	0.3	38.3
Grand Total.....	17,080	20,835	16,634	100.0	100.0	100.0	97.4

Source: *Supplement to Monthly Coal Distribution Report*, Numbers 3, 4, and 6 (mimeographed, issued by the United States Bureau of Mines). *Mineral Resources of the United States* (Part II), 1917, p. 1257, and 1918, p. 1369. Data on imports and tidewater receipts in 1929 were obtained by letter from the United States Bureau of Mines. Totals are based on exact figures, not on rounded numbers.

a Shipped by all-rail from the areas specified. The areas are described in the Introduction.

b Less than 500 tons.

c Less than 0.05 per cent.

Table 15
ALL-RAIL AND TIDEWATER RECEIPTS OF BITUMINOUS COAL
IN NEW ENGLAND, 1919-1934

(Thousands of Net Tons)

Year	All-Rail Receipts	Received from Tidewater Ports ^a					Charleston
		Total	New York	Philadelphia	Baltimore	Hampton Roads	
1919	9,655	8,385	2,510	492	129	5,234	20
1920	12,207	10,456	2,717	809	783	6,142	7
1921	8,374	8,859	1,349	519	972	6,015	3
1922	5,812	10,892	826	284	606	9,088	88
1923	9,634	13,374	1,607	894	1,202	9,628	43
1924	6,985	11,488	1,017	512	580	9,376	3
1925	7,756	13,463	1,026	466	766	11,206	0
1926	8,045	12,949	973	493	977	10,506	0
1927	7,232	14,829	865	626	748	12,590	0
1928	6,473	13,445	729	534	383	11,799	0
1929	6,782	14,445	732	562	276	12,870	5
1930	6,140	14,026	620	620	407	12,380	0
1931	5,611	12,646	472	449	178	11,547	0
1932	4,544	10,618	315	370	19	9,914	0
1933	4,787	11,351	315	346	130	10,559	0
1934	5,423	11,751	365	406	318	10,662	0

Source: *Mineral Resources of the United States* (Part II), 1926, pp. 518-519, and 1928, p. 527, for 1919-1928 data. *Weekly Coal Report* Number W.C.R. 711, February 28, 1931, (mimeographed, issued by the U.S. Bureau of Mines), for 1929-1930 data. Various issues of the *Monthly Coal Distribution Report*, (mimeographed, issued by the United States Bureau of Mines), for 1931-1934 data. The data on all-rail receipts are assembled by the Massachusetts Division on Necessaries of Life.

^a Includes receipts for railroad and vessel fuel.

total receipts. In 1929, only 2,215,000 tons, or 13.3 per cent of all New England receipts, were shipped from the central Pennsylvania district by rail.

Coal shipped by rail from other states did not compete seriously in New England with Pennsylvania coal shipped by all-rail routes. But rail shipments from Pennsylvania suffered heavily from competition with coal traversing a rail-water route to New England. Tidewater coal constituted 52.4 per cent of New England receipts in 1917 and 76.4 per cent in 1929. Some of this coal came from Pennsylvania, but by far the greater share of it came from Virginia, southern West Virginia, and eastern Kentucky. Hampton Roads shipped 62.4 per cent of tidewater coal to New England in 1919 and 89.1 per cent in 1929 (Table 15). The northern ports shipping coal—New York, Philadelphia, and Baltimore—shipped 37.3 per cent of the coal in 1919 and 10.9 per cent in 1929.

For the period 1919-1934 the general trend of tidewater shipments of coal to New England from Hampton Roads was markedly upward, whereas the trend of those from the three northern ports, whose coal shipments are principally Pennsylvania coal, was downward (Chart 11). Receipts by all-rail mainly from Pennsylvania also showed a steep downward trend during the post-War period. It is clear, therefore, that Pennsylvania's share in the New England market was greatly reduced and that the share originating in Virginia, southern West Virginia, and eastern Kentucky was greatly increased.

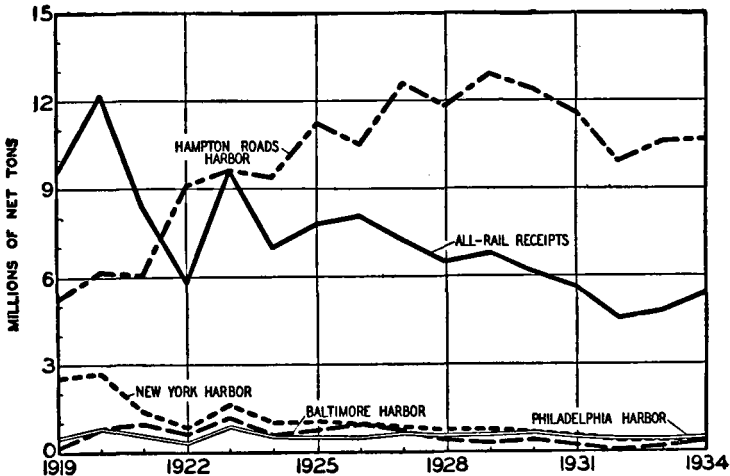
Sources of Bituminous Coal Consumed in Ohio

Ohio ranks second as a market for out-of-state shipments of Pennsylvania bituminous coal, the state ranking first being New York. Coal consumption in Ohio increased considerably during the period from 1917 to 1929. In 1917, 36,454,000 tons were received in the state (excluding railroad and vessel fuel); in 1929, 49,055,000 tons were taken (Table 16). Of the 1917

Chart 11

AMOUNT OF BITUMINOUS COAL RECEIVED IN NEW ENGLAND BY ALL-RAIL ROUTES AND AMOUNT LOADED AT EACH OF THE FOUR MAIN ORIGINATING PORTS FOR SHIPMENT BY VESSEL TO NEW ENGLAND, ANNUAL, 1919-1934

(Data in Table 15)



tonnage, 41.4 per cent was mined in the Ohio area (which includes a very small part of West Virginia), whereas in 1929 only 21.3 per cent of the coal came from that area.

Almost all coal coming into Ohio from outside the state was delivered by all-rail routes. A small tonnage was received by rail-lake, the reason for this roundabout transportation being that the total cost on rail-lake transportation to some of the lake ports is less than the all-rail rates to those ports.

Table 16
BITUMINOUS COAL DESTINED FOR CONSUMPTION IN OHIO
(EXCLUSIVE OF RAILROAD AND VESSEL FUEL),
ACCORDING TO ORIGIN, 1917, 1918, AND 1929

Origin	Thousands of Net Tons			Per Cent of Annual Total			Ratio of 1929 Tonnage to 1917 Tonnage
	1917	1918	1929	1917	1918	1929	
Classified by Originating Areas:				%	%	%	%
Pennsylvania Area:							
Central Pennsylvania.....	175	106	226	0.5	0.3	0.5	129.1
Western Pennsylvania-Panhandle.....	8,981 ^a	10,297	14,052	24.6	25.3	28.6	156.5
Somerset-Meyersdale and Cumberland-Piedmont.....	236	163	180	0.6	0.4	0.4	76.3
Total.....	9,392 ^b	10,566	14,458	25.8	25.9	29.5	153.9
Ohio Area.....	15,099 ^b	17,730	10,428	41.4	43.5	21.3	69.1
Northern West Virginia Area.....	511 ^b	208	2,532	1.4	0.5	5.2	495.5
Southern West Virginia Area.....	8,397 ^b	8,740	15,561	23.0	21.5	31.7	185.3
Eastern Kentucky-Tennessee Area.....	2,693 ^b	3,289	5,276	7.4	8.1	10.8	195.9
Virginia Area.....	78	49	439	0.2	0.1	0.9	562.8
Illinois and Indiana Area.....	197	56	0	0.5	0.1	0.0	—
Western Kentucky Area.....	30	23	0	0.1	0.1	0.0	—
Not Classified by Originating Areas:							
Great Lakes.....	56	67	359	0.2	0.2	0.7	641.1
Grand Total.....	36,454^b	40,727	49,055	100.0	100.0	100.0	134.6

Source: *Supplement to Monthly Coal Distribution Reports*, Numbers 3, 4, and 6 (mimeographed, issued by the United States Bureau of Mines). *Mineral Resources of the United States* (Part II), 1917, p. 1258 and 1918, p. 1370. Data on imports and tidewater receipts in 1929 were obtained by letter from the United States Bureau of Mines. Totals are based on exact figures, not on rounded numbers.

^a For the Ohio Coal fields, the tonnage consists of coal used at mines for power and heat, coal sold to local trade, coal made into coke at mines, and coal shipped by rail or river to Ohio points; for all other coal fields, coal shipped by rail or river to Ohio. The areas are described in the Introduction.

^b In order to make the data for 1917 comparable with those for 1918 and 1929, the following estimated shipments of coal to Ohio lake ports for use as vessel fuel have been deducted: 869,000 tons from the western Pennsylvania-Panhandle district, 522,000 tons from the Ohio area, 12,000 tons from the northern West Virginia district, 132,000 tons from the southern West Virginia area, and 21,000 tons from the eastern Kentucky-Tennessee area. See Table 26.

Pennsylvania producers obtained part of the market lost by the Ohio producers, but by far the larger part was obtained by West Virginia and Kentucky producers. The eastern Kentucky-Tennessee area almost doubled its rail shipments to Ohio from 1917 to 1929. In the latter year, this area supplied by rail 10.8 per cent of the coal taken by Ohio; the Pennsylvania area supplied 29.5 per cent; the northern West Virginia area, 5.2 per cent; and the southern West Virginia area, 31.7 per cent. Almost all the Pennsylvania area shipments originated in the western Pennsylvania-Panhandle district.

Annual data for the period 1919-1934 on all-rail shipments of bituminous coal from the Appalachian coal fields to Ohio points indicate that there were decided increases until 1929 in the Ohio receipts from nearly all producing areas except the Ohio area (Chart 12 and Table 17). Rail shipments from Ohio mines to Ohio points declined sharply during the years 1919-1928. In 1929, however, Ohio mines increased both their tonnage and their percentage in Ohio markets; and in 1930 and

Chart 12
ALL-RAIL SHIPMENTS OF BITUMINOUS COAL TO OHIO FROM EACH OF SIX APPALACHIAN AREAS, ANNUAL, 1919-1934
(Data in Table 17)

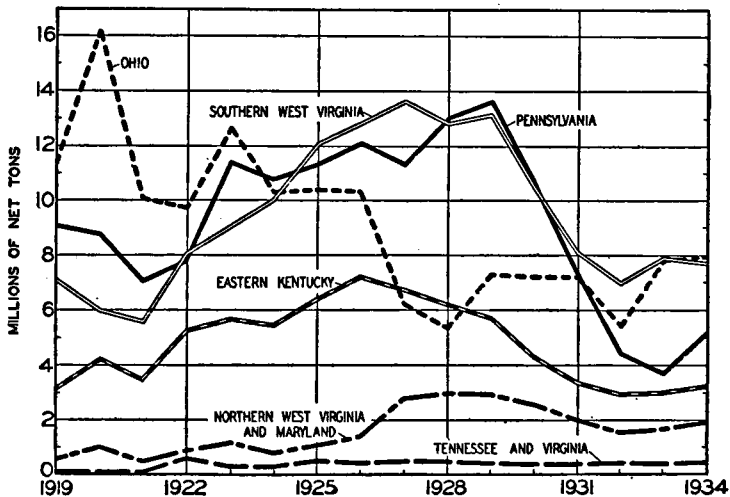


Table 17
ALL-RAIL SHIPMENTS OF BITUMINOUS COAL FROM THE APPALACHIAN FIELDS
TO OHIO, ACCORDING TO ORIGIN, 1919-1934.
(Thousands of Net Tons)

Year	Western Pennsylvania	Central Pennsylvania-Meyerdale	Cumberland-Piedmont	Northern West Virginia	Ohio ^a	Eastern Kentucky	Southern West Virginia	Tennessee	Virginia	Total
1919	8,934	144	4	567	11,320	3,121	7,066	19	64	31,239
1920	8,464	286	20	988	16,170	4,198	5,987	48	41	36,204
1921	6,946	112	2	458	10,048	3,447	5,567	22	78	26,681
1922	7,574	230	6	850	9,718	5,239	8,020	186	423	32,247
1923	11,234	163	9	1,161	12,653	5,671	9,032	105	197	40,225
1924	10,668	81	4	774	10,288	5,430	10,005	68	202	37,519
1925	11,073	244	2	1,078	10,415	6,366	12,074	130	237	41,619
1926	11,943	173	8	1,391	10,319	7,196	12,822	118	239	44,233
1927	11,207	146	3	2,802	6,221	6,736	13,586	145	282	41,128
1928	12,848	176	5	2,983	5,335	6,208	12,810	155	283	40,802
1929	13,427	196	5	2,949	7,296	5,663	13,145	142	272	43,095
1930	10,392	266	4	2,567	7,208	4,264	10,479	106	242	35,527
1931	7,125	191	7	1,994	7,218	3,312	8,050	87	233	28,217
1932	4,360	57	10	1,498	5,417	2,923	6,961	92	267	21,585
1933	3,595	116	7	1,640	7,810	2,990	7,830	57	296	24,339
1934	5,015	174	24	1,886	7,970	3,227	7,695	68	319	26,378

Source: Ohio Bureau of Coal Statistics. Obtained through the cooperation of the Coal Control Association of Western Pennsylvania.

^a For a description of the originating areas, see Exhibit B in Appendix A.

^b Rail Shipments only; does not include coal made into coke at mines, coal used at mines for power and heat, and coal sold to local trade.

RECEIPTS IN MAJOR AREAS

1931, when receipts from outside the state were declining, the Ohio mines maintained their tonnage and, therefore, again increased their percentage. After a slump in 1932, the Ohio producers experienced further recovery in the markets of that state in 1933; and, in 1934, Ohio took more coal from Ohio mines than from any other producing area.²² This recovery was an important factor in halting the disastrous decline in Ohio coal production.

That Ohio consumed more coal from the Pennsylvania area in 1929 than in 1917 was due to the expansion of the by-product coke industry in Ohio (Table 50). Between 1917 and 1929, total rail shipments of coal from the Pennsylvania area to Ohio increased 5,066,000 tons; for the same period rail shipments from Pennsylvania (the state only) to Ohio for use in by-product ovens increased 4,508,000 tons (Tables 16 and 50). Shipments of West Virginia coal to Ohio for coke making also showed a large increase.

Sources of Bituminous Coal Consumed in Michigan

The use of bituminous coal in Michigan has grown at an exceptionally rapid rate. Coal receipts (except railroad and vessel fuel) in that state increased from 14,771,000 tons in 1917 to 25,806,000 tons in 1929 (Table 18). Some of this coal was mined in Michigan; but the amount, never very large, decreased rapidly. Of the state's receipts (other than railroad and vessel fuel) in 1929, only 323,000 tons, or 1.3 per cent, came from Michigan mines.

Pennsylvania coal producers shipped small amounts by rail to Michigan points in 1917, 1918, and 1929. Both the amount shipped by rail from the Pennsylvania area and the percentage that these shipments constituted of total deliveries were lower in 1929 than in 1917 or in 1918. In 1929 a little less than one per cent of the soft coal used in Michigan came by all-rail shipment from the Pennsylvania area.

West Virginia and Kentucky, in 1929, originated the bulk of the rail shipments of coal to Michigan. In 1917 and 1918, both the Ohio fields and the Illinois-Indiana fields were im-

²² It should be remembered, moreover, that the rail shipments do not include coal used at mines, coal coked at mines, and coal sold to local trade. These items are included in the tonnages for Ohio mines in Table 16.

Table 18
 BITUMINOUS COAL DESTINED FOR CONSUMPTION IN
 MICHIGAN (EXCLUSIVE OF RAILROAD AND VESSEL FUEL),
 ACCORDING TO ORIGIN, 1917, 1918, AND 1929

Origin	Thousands of Net Tons			Per Cent of Annual Total			Ratio of 1929 Tonnage to 1917 Tonnage
	1917	1918	1929	1917	1918	1929	
Classified by Originating Areas:				%	%	%	%
Pennsylvania Area:							
Central Pennsylvania..	25	24	6	0.2	0.1	^b	24.0
Western Pennsylvania-Panhandle.....	290	415	229	2.0	2.1	0.9	79.0
Somerset-Meyersdale and Cumberland-Piedmont.....	5	15	6	^b	0.1	^b	120.0
Total.....	320	454	241	2.2	2.3	0.9	75.3
Ohio Area.....	2,779	4,129	751	18.8	20.6	2.9	27.0
Northern West Virginia Area.....	261	198	159	1.8	1.0	0.6	60.9
Southern West Virginia Area.....	4,612	5,495	11,593	31.2	27.5	44.9	251.4
Eastern Kentucky-Tennessee Area.....	1,594	1,910	6,387	10.8	9.6	24.8	400.7
Virginia Area.....	84	52	385	0.6	0.3	1.5	458.3
Michigan Area.....	1,014	1,190	323	6.9	6.0	1.3	31.9
Illinois and Indiana Area.....	1,380	2,723	84	9.3	13.6	0.3	6.1
Western Kentucky Area.....	0	^c	84	0.0	^b	0.3	---
Not Classified by Originating Areas:							
Great Lakes.....	2,727	3,845	5,798	18.5	19.2	22.5	212.6
Imports.....	^c	5	0	^b	^b	0.0	---
Grand Total.....	14,771	20,000	25,806	100.0	100.0	100.0	174.7

Source: *Supplement to Monthly Coal Distribution Report*, Numbers 3, 4, and 6 (mimeographed, issued by the United States Bureau of Mines). *Mineral Resources of the United States* (Part II), 1917, p. 1257, and 1918, p. 1369. Data on imports and tidewater receipts in 1929 were obtained by letter from the United States Bureau of Mines. Totals are based on exact figures, not on rounded numbers.

^a For the Michigan coal fields the tonnage consists of coal used at mines for power and heat, coal sold to local trade, coal made into coke at the mines, and coal shipped by rail to Michigan points; for all other coal fields, coal shipped by rail to Michigan. The areas are described in the Introduction.

^b Less than 0.05 per cent.

^c Less than 500 tons.

portant, rail shipments from these fields being more than a quarter of total Michigan receipts; but, in 1929, tonnage from these states accounted for less than 4 per cent. It is evident that the increased rail shipments to Michigan from the southern West Virginia and eastern Kentucky-Tennessee areas replaced those from Ohio, Illinois, and Indiana. The Ohio rail shipments to Michigan were especially hard hit in 1924 (Table 19). That was the year in which the Jacksonville agreement was signed. Under that agreement, most northern operators contracted to continue the relatively high union rates; but

operators in large areas of the southern Appalachian region refused to sign the agreement. After the abandonment of the Jacksonville agreement in 1928 the Ohio shipments to Michigan recovered, and in the depression year 1934 they were five times as large as in 1928. Pennsylvania as early as 1917 was practically out of the Michigan markets, except with respect to lake shipments, in spite of the fact that western Pennsylvania mines are nearer to Michigan than any other Appalachian mines except those in Ohio and the Panhandle of West Virginia.

Mines in the Pittsburgh field range from 50 to 175 miles closer by rail to Michigan points than mines in the principal competitive fields of the southern Appalachian area. The system of freight rates, however, does not reflect the differences in the length of haul from these fields. Coal from the Pittsburgh field bears as high a rail rate to Michigan as that from more distant fields in southern West Virginia and Kentucky.

Michigan obtained an increasing amount of coal by lake vessels, receiving in 1929 by this means of transportation 5,798,000 tons, or 22.5 per cent of all receipts, as compared with 2,727,000 tons, or 18.5 per cent, in 1917 (Table 18). The Pennsylvania area in 1929 originated 23.3 per cent of the total bituminous coal carried in lake vessels; in 1917, 30.3 per cent (Table 24). Part of this coal probably went to Michigan. It is doubtful, however, that lake shipments of Pennsylvania coal to Michigan increased from 1917 to 1929, for Pennsylvania's share of total lake shipments decreased in that period.

Sources of Bituminous Coal Consumed in Illinois and Indiana

Coal shipments to Illinois and those to Indiana are not dealt with separately, because the Chicago district, an important coal consuming area, covers part of each state. Figures for the Chicago district for 1929 were segregated by the Bureau of Mines, but those for 1917 and 1918 were not.

Bituminous coal received in these two states (except receipts by all-rail routes for the consumption of railroads and vessels) increased by 13,927,000 tons from 1917 to 1929 (Table 20). The receipts in the latter year were 77,385,000 tons. Of

Table 19
ALL-RAIL SHIPMENTS OF BITUMINOUS COAL FROM THE APPALACHIAN FIELDS
TO MICHIGAN, ACCORDING TO ORIGIN, 1919-1934^a
(Thousands of Net Tons)

Year	Western Pennsylvania	Central Pennsylvania-Meyersdale	Cumberland-Piedmont	Northern West Virginia	Ohio	Eastern Kentucky	Southern West Virginia	Tennessee	Virginia	Total
1919	410	30	5	359	2,612	1,828	5,161	20	42	10,467
1920	382	22	12	372	3,625	2,430	5,138	18	33	12,032
1921	199	12	1	168	1,363	2,820	5,078	5	66	9,711
1922	366	19	3	206	1,647	3,566	6,494	70	149	12,520
1923	541	32	5	448	1,820	4,689	8,876	86	149	16,647
1924	89	28	1	229	835	5,478	9,211	75	112	16,057
1925	83	11	1	147	545	6,103	10,468	75	108	17,541
1926	117	15	6	98	735	6,934	10,590	115	131	18,741
1927	227	5	6	147	258	6,864	11,056	140	137	18,841
1928	91	8	4	72	281	6,609	10,851	144	214	18,275
1929	220	7	4	157	750	6,212	11,478	136	276	19,248
1930	239	13	1	203	1,012	5,339	9,137	72	167	16,203
1931	226	3	4	213	1,052	4,248	7,038	39	125	12,947
1932	84	2	3	140	915	3,576	6,448	36	138	11,337
1933	92	2	1	170	1,256	3,758	6,789	36	115	12,219
1934	237	3	3	222	1,415	4,267	7,331	43	160	13,681

Source: Ohio Bureau of Coal Statistics. Obtained through the cooperation of the Coal Control Association of Western Pennsylvania.
^a For a description of the originating areas, see Exhibit B in Appendix A.

RECEIPTS IN MAJOR AREAS

Table 20

**BITUMINOUS COAL DESTINED FOR CONSUMPTION IN ILLINOIS
AND INDIANA (EXCLUSIVE OF RAILROAD AND VESSEL FUEL),
ACCORDING TO ORIGIN, 1917, 1918, AND 1929**

Origin	Thousands of Net Tons			Per Cent of Annual Total			Ratio of 1929 Tonnage to 1917 Tonnage
	1917	1918	1929	1917	1918	1929	
Classified by Originating Areas:^a				%	%	%	%
Pennsylvania Area:							
Central Pennsylvania..	77	83	24	0.1	0.1	b	31.2
Western Pennsylvania- Panhandle.....	167	218	312	0.3	0.3	0.4	186.8
Somerset-Meyersdale and Cumberland- Piedmont.....	16	19	34	b	b	b	212.5
Total.....	260	320	371	0.4	0.5	0.5	142.7
Ohio Area.....	398	296	174	0.6	0.4	0.2	43.7
Northern West Virginia Area.....	90	32	123	0.1	b	0.2	136.7
Southern West Virginia Area.....	6,572	5,593	18,944	10.4	8.0	24.5	288.3
Eastern Kentucky-Ten- nessee Area.....	2,181	2,653	9,388	3.4	3.8	12.1	430.4
Virginia Area.....	189	108	326	0.3	0.2	0.4	172.5
Illinois and Indiana Area	50,958	58,858	39,960	80.3	84.4	51.6	78.4
Western Kentucky Area..	1,167	372	2,726	1.8	0.5	3.5	233.6
Alabama Area.....	0	0	2	0.0	0.0	b	b
West of the Mississippi...	20	32	4	b	b	b	0.2
Not Classified by Originating Areas:							
Great Lakes.....	1,613	1,461	5,368	2.5	2.1	6.9	332.8
Imports.....	10	14	c	b	b	b	-----
Grand Total.....	63,458	69,740	77,385	100.0	100.0	100.0	121.9

Source: *Supplement to Monthly Coal Distribution Report*, Numbers 1, 3, 4, and 6 (mimeographed, issued by the United States Bureau of Mines). *Mineral Resources of the United States* (Part II), 1917, p. 1256, and 1918, p. 1368. Data on imports and tidewater receipts in 1929 were obtained by letter from the United States Bureau of Mines. Totals are based on exact figures, not on rounded numbers.

^a For the Illinois and Indiana coal fields, the tonnage consists of coal used at mines for power and heat, coal sold to local trade, coal made into coke at the mines, and coal shipped by rail or river to Illinois and Indiana points; for all other coal fields, coal shipped by rail or river to Illinois and Indiana. The areas are described in the Introduction.

^b Less than 0.05 per cent.

^c Less than 500 tons.

this amount, more than half was mined within the two states. In 1917 and 1918, 80.3 per cent and 84.4 per cent, respectively, of all coal consumed in Illinois and Indiana was mined within the two states. In recent years, however, Illinois and Indiana producers have lost a considerable proportion of the market within their state lines to mines in other states. An increasing share of the market has been served by all-rail routes from the eastern Kentucky-Tennessee area and the southern West Virginia area. The coals in Illinois and Indiana are not well suited

for coking; consequently, the growing by-product coke industry in these states has been an expanding market for West Virginia and Kentucky coal (Table 50).

Rail shipments of coal from the Pennsylvania area to the Illinois-Indiana area have not been important at any time since 1917 (Tables 20 and 21). The shipments from the Pennsylvania area were only 260,000 tons in 1917 and only 371,000 tons in 1929. Probably a considerably larger tonnage, however, was delivered in both years by rail-lake routes. Total receipts of coal by lake in Illinois and Indiana were 1,613,000 tons in 1917 and 5,368,000 tons in 1929. In 1917 the Pennsylvania area originated 30.3 per cent of total lake coal, including that shipped to destinations outside the Illinois-Indiana area; in 1929, 23.3 per cent. It is improbable, therefore, that the Pennsylvania area shared to a large extent in the increase in the lake shipments to Illinois and Indiana between 1917 and 1929.

Summary

From 1917 to 1929 consumption of bituminous coal (as measured by receipts) in New York, New Jersey, Ohio, Michigan, and Illinois-Indiana increased substantially, and that in Pennsylvania declined severely. Receipts of bituminous coal in New England fell slightly.

In 1929, Pennsylvania led in coal received for consumption, with a total of 64 million tons; Illinois and Indiana together received 77 million tons; Ohio receipts alone totaled 49 million tons; New York, 28 million tons; Michigan, 26 million tons; New England states as a group received 17 million tons; and New Jersey, somewhat less than 10 million tons.

In the period studied, mines in Pennsylvania supplied most of the bituminous coal used in Pennsylvania, but increasing proportions came by way of tidewater from southern Appalachian fields and by rail from the northern West Virginia district.

New York state received an increasing amount of coal from Pennsylvania by rail, but the proportion coming from Pennsylvania declined. In 1929 more than half the coal received by all-rail routes came from Pennsylvania. An increas-

Table 21
ALL-RAIL SHIPMENTS OF BITUMINOUS COAL FROM THE APPALACHIAN FIELDS
TO ILLINOIS AND INDIANA, ACCORDING TO ORIGIN, 1919-1934^a
 (Thousands of Net Tons)

Year	Western Pennsylvania	Central Pennsylvania-Meyersdale	Cumberland-Piedmont	Northern West Virginia	Ohio	Eastern Kentucky	Southern West Virginia	Tennessee	Virginia	Total
1919	390	538	75	342	732	3,921	8,267	20	160	14,446
1920	220	141	52	112	682	4,026	7,105	12	148	12,496
1921	158	61	31	54	363	4,156	6,183	1	183	11,189
1922	109	98	17	74	388	5,076	8,176	14	224	14,177
1923	238	143	46	129	333	6,110	11,288	11	166	18,462
1924	17	155	33	52	244	6,939	12,298	32	454	20,223
1925	102	50	29	59	193	7,185	15,205	80	588	23,492
1926	71	60	23	49	156	7,484	16,079	60	461	24,442
1927	161	25	17	265	64	8,240	17,095	83	540	26,490
1928	240	25	13	89	86	8,369	16,071	42	321	25,256
1929	310	23	29	118	174	8,532	17,625	55	194	27,060
1930	116	22	27	100	185	7,538	14,213	50	172	22,424
1931	3	15	25	40	126	5,243	11,073	34	167	16,725
1932	1	8	11	48	88	3,819	9,632	28	193	13,629
1933	4	11	14	63	107	4,121	9,620	26	186	14,152
1934	20	10	23	62	92	3,997	9,698	34	181	14,117

Source: Ohio Bureau of Coal Statistics. Obtained through the cooperation of the Coal Control Association of Western Pennsylvania.
^a For a description of the originating areas, see Exhibit B in Appendix A.

10929
 GS
 X9F551:51.73.N3

ing proportion of the coal used in New York was received by vessel from tidewater and lake ports. It is probable that most of this coal originated in southern Appalachian fields.

In New Jersey likewise most of the coal received by all-rail routes came from Pennsylvania. From 1917 to 1929, all-rail shipments from Pennsylvania to New Jersey increased in amount but declined as a percentage of total New Jersey receipts. An increasing proportion of the bituminous coal used in New Jersey came by vessel from tidewater ports, chiefly from Hampton Roads, which serves the southern Appalachian fields.

All-rail shipments of bituminous coal to New England from Pennsylvania declined substantially from 1917 to 1929. On the other hand, New England receipts of coal from the southern Appalachian fields by way of tidewater were greatly enlarged.

In 1929 a slightly greater proportion of the coal used in Ohio came from Pennsylvania than in 1917. Ohio producers lost a large portion of the Ohio coal market, whereas producers in the southern Appalachian fields gained heavily.

Michigan coal receipts in increasing proportion came by all-rail routes from the southern Appalachian fields. By 1929, Pennsylvania and Illinois-Indiana producers had lost what little foothold they had in the Michigan market in 1917. Ohio, which in 1917 supplied almost a fifth of the coal used in Michigan, was almost completely squeezed out. Receipts by lake vessel in Michigan increased both in amount and as a percentage of total receipts. Production in the mines of the state fell severely from 1917 to 1929.

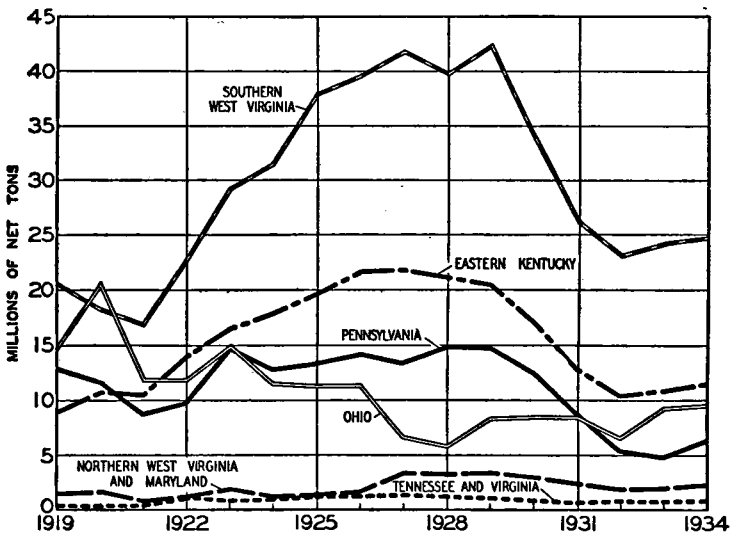
Illinois and Indiana combined took increasing amounts of southern Appalachian coal by rail from 1917 to 1929. Receipts of coal produced in Illinois and Indiana declined sharply, and receipts by lake vessel increased. Western Kentucky producers increased their share of the Illinois-Indiana market. Little coal was received from the northern Appalachian fields in any of the years compared.

A summary of all-rail shipments from the various northern and southern Appalachian producing areas to the consum-

Chart 13

ALL-RAIL SHIPMENTS OF BITUMINOUS COAL FROM EACH OF SIX APPALACHIAN AREAS TO THE AREA COMPOSED OF OHIO, MICHIGAN, ILLINOIS, INDIANA, AND NORTHWESTERN PENNSYLVANIA, ANNUAL, 1919-1934

(Based on Data in Table 22)



ing area consisting of Ohio, Michigan, Illinois, Indiana, and northwestern Pennsylvania for the period 1919-1934 is presented in Chart 13 and Tables 22 and 23. Rail shipments from western Pennsylvania to this central consuming area had shown approximately a horizontal trend prior to the depression; those from the Ohio mines to that area had shown a downward trend; and those from northern West Virginia, from eastern Kentucky, from southern West Virginia, and from Virginia had shown a steep upward trend.

During the present depression, the rail shipments from all originating coal areas to this central consuming area have declined; but the declines have been uneven, owing either to changes in the competitive positions of the districts or to the varying extent of curtailment in the uses of different types of

Table 22
ALL-RAIL SHIPMENTS OF BITUMINOUS COAL FROM THE APPALACHIAN FIELDS TO THE AREA
CONSISTING OF NORTHWESTERN PENNSYLVANIA, OHIO, MICHIGAN, INDIANA,
AND ILLINOIS, ACCORDING TO ORIGIN, 1919-1934^a

(Thousands of Net Tons)

Year	Western Pennsylvania	Central Pennsylvania-Meyersdale	Cumberland-Piedmont	Northern West Virginia	Ohio	Eastern Kentucky	Southern West Virginia	Tennessee	Virginia	Total
1919	12,178	718	85	1,298	14,664	8,874	20,496	59	266	58,638
1920	11,189	465	84	1,557	20,477	10,671	18,229	78	222	62,972
1921	8,512	189	34	721	11,774	10,430	16,828	28	326	48,843
1922	9,363	367	27	1,169	11,753	13,911	22,698	271	798	60,356
1923	14,253	348	60	1,835	14,806	16,483	29,198	203	513	77,697
1924	12,460	273	38	1,148	11,367	17,857	31,519	175	768	75,605
1925	12,951	317	32	1,336	11,154	19,666	37,761	285	935	84,435
1926	13,877	263	36	1,602	11,315	21,628	39,566	293	854	89,435
1927	13,166	185	26	3,303	6,569	21,855	41,809	367	960	88,240
1928	14,641	215	21	3,248	5,708	21,201	39,779	341	819	85,973
1929	14,600	231	38	3,328	8,257	20,426	42,283	334	742	90,240
1930	12,114	307	33	2,960	8,434	17,155	33,876	227	581	75,687
1931	8,434	213	36	2,318	8,424	12,815	26,194	159	525	59,118
1932	5,301	70	24	1,778	6,436	10,323	23,074	156	595	47,756
1933	4,615	137	22	1,942	9,199	10,877	24,262	119	597	51,769
1934	6,187	192	51	2,228	9,491	11,496	24,751	145	660	55,201

Source: Ohio Bureau of Coal Statistics. Obtained through the cooperation of the Coal Control Association of Western Pennsylvania.

^a For a description of the originating areas, see Exhibit B in Appendix A.

RECEIPTS IN MAJOR AREAS

coal. For example, a district supplying coal chiefly for domestic use has suffered less in the depression than one which has relied mainly on industrial demand. A large proportion of Ohio coal is used for domestic purposes, and Ohio's share in the all-rail shipments to the central consuming area increased from 9.2 per cent in 1929 to 13.5 per cent in 1932. In 1933 the share increased to 17.8 per cent, but probably because of a reduction in intrastate shipping rates, the gain being in intrastate shipments. Pennsylvania loaded 16.4 per cent of the Appalachian coal for westward shipment in 1929, 11.2 per cent in 1932, and 9.2 per cent in 1933. In 1934, when the Bituminous Coal Code under NRA was in full force, Pennsylvania's share increased to 11.6 per cent. Ohio's share showed a small decline from 1933 to 1934; but, even so, it was larger than in any of the years 1929-1932. Invalidation in May, 1934 of the reduced intrastate freight rates in Ohio undoubtedly was wholly or partially responsible for the relative loss of the Ohio mines.

Table 23

ALL-RAIL SHIPMENTS OF BITUMINOUS COAL FROM EACH OF SIX APPALACHIAN AREAS TO THE AREA CONSISTING OF NORTHWESTERN PENNSYLVANIA, OHIO, MICHIGAN, ILLINOIS AND INDIANA, AS PERCENTAGE OF TOTAL, 1919-1934^a

Year	Western Pennsylvania and Central Pennsylvania-Meyersdale	Cumberland-Piedmont and Northern West Virginia	Ohio	Eastern Kentucky	Southern West Virginia	Tennessee and Virginia	Total
	%	%	%	%	%	%	%
1919	22.0	2.4	25.0	15.1	35.0	0.6	100.0
1920	18.5	2.6	32.5	16.9	28.9	0.5	100.0
1921	17.8	1.5	24.1	21.4	34.5	0.7	100.0
1922	16.1	2.0	19.5	23.0	37.6	1.8	100.0
1923	18.8	2.4	19.1	21.2	37.6	0.9	100.0
1924	16.8	1.6	15.0	23.6	41.7	1.2	100.0
1925	15.7	1.6	13.2	23.3	44.7	1.4	100.0
1926	15.8	1.8	12.7	24.2	44.2	1.3	100.0
1927	15.1	3.8	7.4	24.8	47.4	1.5	100.0
1928	17.3	3.8	6.6	24.7	46.3	1.3	100.0
1929	16.4	3.7	9.2	22.6	46.9	1.2	100.0
1930	16.4	4.0	11.1	22.7	44.8	1.1	100.0
1931	14.6	4.0	14.2	21.7	44.3	1.2	100.0
1932	11.2	3.8	13.5	21.6	48.3	1.6	100.0
1933	9.2	3.8	17.8	21.0	46.9	1.4	100.0
1934	11.6	4.1	17.2	20.8	44.8	1.5	100.0

^a Computed from data in Table 22.

CHAPTER 5

Sources and Distribution of Bituminous Coal Shipped on the Great Lakes

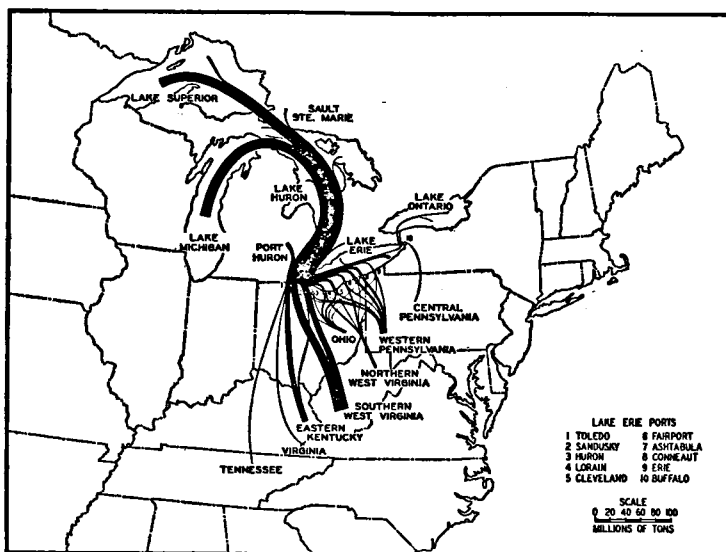
The Great Lakes trade is an important focal point for competition in Appalachian bituminous coal. Most of the coal shipped on the lakes is loaded at ports on the southern shore of Lake Erie, from Toledo, Ohio, eastward as far as Erie, Pennsylvania; but a small additional amount, coming almost exclusively from central Pennsylvania, is loaded at Buffalo and at Lake Ontario ports. Each winter, shipments to the lakes are suspended, but the lake trade is an important sustaining factor to mine operations in the other seasons of the year, when domestic demand is low. A summary of lake cargo coal traffic in 1929, by source and by general destination, is shown in Chart 14.

The lake traffic in coal has increased in importance. In 1917, 28,666,000 tons of bituminous coal were shipped to the Great Lakes; in 1929, the shipments amounted to 39,205,000 tons (Table 24). The major part of this coal was cargo destined for American and Canadian ports on the lakes. A small part was vessel fuel. Tonnage classified as lake shipments does not include car-ferry traffic, this traffic being counted as all-rail movement.

Shifts among Originating Areas

Lake shipments of coal originating in the Pennsylvania area amounted to 8,675,000 tons in 1917 and to 9,122,000 tons in 1929. The bulk of these shipments (97.2 per cent in 1917 and 98.0 per cent in 1929) originated in the western Pennsylvania-Panhandle district. The share of the Pennsylvania area in the lakes trade decreased from 30.3 per cent in 1917 to 23.3 per cent in 1929. The Ohio area suffered even a larger loss, the decline being from 29.2 per cent in 1917 to 9.5 per cent in 1929. The share lost by the northern mines was offset by gains in the share of the southern Appalachian fields. Mines in the

Chart 14
LAKE CARGO BITUMINOUS COAL SHIPMENTS IN 1929,
ACCORDING TO ORIGIN AND DESTINATION*
 (Data in Tables 26 and 29)



*Widths of bands are proportional to the amounts of coal moved.

southern West Virginia area increased their share in the lake outlet from 32.7 per cent in 1917 to 45.5 per cent in 1929; and the share of mines in the eastern Kentucky-Tennessee area rose from only 4.2 per cent in 1917 to 17.5 per cent in 1929. The share of each major producing area in lake cargo shipments is shown in Chart 14 for every fifth year in the period 1909-1934.

From 1909 through 1914 shipments of bituminous coal from Pennsylvania to the lakes for loading into vessels as cargo were approximately half of total shipments to the lakes (Table 25, Charts 15-16). From 1915 to 1918, shipments to the lakes from Pennsylvania declined, while total lake shipments increased. In 1919, following the War, total lake shipments fell to a level about 25 per cent under the War-time peak, where they remained until 1923. Pennsylvania lake shipments

Table 24
SHIPMENTS OF BITUMINOUS COAL TO LAKE ERIE PORTS FOR
LOADING AS CARGO OR AS VESSEL FUEL, ACCORDING
TO ORIGIN, 1917, 1918, AND 1929

Originating Area ^a	Thousands of Net Tons			Per Cent of Annual Total			Ratio of 1929 Tonnage to 1917 Tonnage
	1917	1918	1929	1917	1918	1929	
Pennsylvania Area				%	%	%	%
Central Pennsylvania.....	196 ^b	12 ^b	180	0.7	ε	0.5	91.8
Western Pennsylvania-Panhandle.....	8,428 ^d	9,028	8,939	29.4	30.3	22.8	106.1
Somerset-Meyersdale and Cumberland-Piedmont.....	51	0	3	0.2	0.0	ε	5.9
Total.....	8,675 ^d	9,040	9,122	30.3	30.4	23.3	105.2
Ohio Area.....	8,374 ^d	10,107	3,728	29.2	33.9	9.5	44.5
Northern West Virginia Area.....	1,041 ^d	1,331	1,510	3.6	4.5	3.9	145.1
Southern West Virginia Area.....	9,360 ^d	7,960	17,825	32.7	26.7	45.5	190.4
Eastern Kentucky-Tennessee Area.....	1,210 ^d	1,334	6,857	4.2	4.5	17.5	566.7
Virginia Area.....	6	0	162	ε	0.0	0.4	2700.0
Grand Total.....	28,666 ^d	29,772	39,205	100.0	100.0	100.0	136.8

Source: *Supplement to Monthly Coal Distribution Report*, Numbers 3, 4, and 6 (mimeographed, issued by the United States Bureau of Mines). Totals are based on exact figures, not on rounded numbers.

^a The areas are described in the Introduction.

^b Exports to Canada by way of Lake Ontario have been excluded.

^c Less than 0.05 per cent.

^d In order to make the data for 1917 comparable with those for 1918 and 1929, the following estimated shipments of coal to the Great Lakes for use as vessel fuel have been added: 924,000 tons from the western Pennsylvania-Panhandle district, 553,000 tons from the Ohio area, 12,000 tons from the northern West Virginia area, 132,000 tons from the southern West Virginia area, and 21,000 tons from the eastern Kentucky-Tennessee area. See Table 26.

continued to decline after the War. In 1922, a year of widespread mining strikes and of a strike of railroad shopmen, lake shipments fell very sharply. In 1923, with increased industrial activity, in the face of a carry-over of the coal shortage, total lake shipments reached a peak higher than any that had preceded. Pennsylvania shipments to the lakes also increased substantially in 1923, but they failed to reach the pre-War levels. Pennsylvania shipments to the lakes for cargo tumbled from 9,560,000 tons in 1923 to 4,282,000 tons in 1924 and to 2,480,000 tons in 1925; Ohio shipments fell from 5,953,000 tons in 1923 to 4,004,000 tons in 1924 and to 1,452,000 tons in 1925. On the other hand, the shipments from southern West Virginia, eastern Kentucky, and the Virginia-Tennessee area increased enormously during the same three years. Shipments to the lakes from northern fields continued to be rela-

tively low in 1926 and 1927. In 1927, Pennsylvania shipments to the lakes for cargo totaled 3,613,000 tons; in 1928, they increased to 6,631,000 tons; in 1929, to 8,045,000 tons. Ohio shipments, amounting to only 346,000 tons in 1927, rose to 1,053,000 tons in 1928, and to 3,209,000 tons in 1929. During the same three years, the shipments from the southern Appalachian fields showed either losses or only small gains. Even during the current depression, the Pennsylvania and Ohio shipments to the lakes have held up remarkably well. The Pennsylvania shipments, for example, were much larger in each of the years 1930-1934 than they were in 1925, 1926, or 1927. In 1934, the Pennsylvania lake cargo shipments increased to 10,589,000 tons, a figure not equaled in any of the years 1915-1933.

There have been major shifts among the sources of cargo coal on the Great Lakes. Before the War, Pennsylvania was

Chart 15
PER CENT OF LAKE CARGO SHIPMENTS ORIGINATING
IN EACH MAJOR PRODUCING AREA,
EVERY FIFTH YEAR, 1909-1934
 (Based on Table 25)

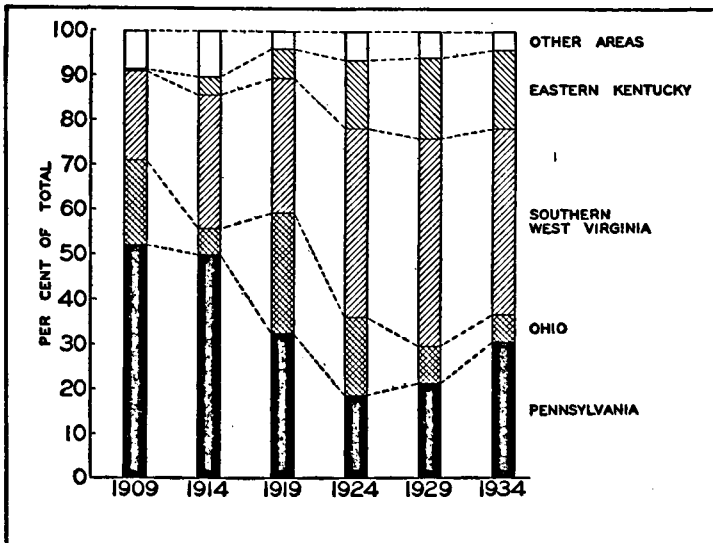


Table 25
 SHIPMENTS OF BITUMINOUS COAL TO LAKE ERIE PORTS FOR
 LOADING INTO VESSELS AS CARGO, ACCORDING
 TO ORIGIN, 1909-1934
 (Thousands of Net Tons)

Year	Penn- sylvania ^a	Ohio	Northern West Virginia and Maryland ^b	Southern West Virginia ^c	Eastern Kentucky	Virginia and Tennessee	Total
1909	8,055	2,918	1,316	3,052	8	0	15,351
1910	10,442	3,768	1,713	4,333	11	0	20,267
1911	10,228	4,110	1,828	5,452	10	0	21,627
1912	10,053	4,318	1,721	5,192	27	0	21,310
1913	12,563	5,646	2,194	6,030	397	0	26,830
1914	10,640	1,247	2,251	6,388	859	0	21,384
1915	9,620	2,484	2,057	6,646	701	0	21,507
1916	8,768	5,302	1,629	8,074	920	0	24,693
1917	7,549	7,821	1,036	9,228	1,189	6	26,829
1918	8,150	9,537	1,317	7,838	1,315	d	28,157
1919	7,080	5,840	837	6,559	1,425	15	21,756
1920	7,270	7,607	1,306	4,832	1,375	d	22,391
1921	6,661	5,538	1,019	6,517	2,624	4	22,364
1922	5,291	3,386	1,371	5,370	3,091	69	18,578
1923	9,560	5,953	3,170	7,859	3,297	1	29,840
1924	4,282	4,004	1,409	9,716	3,514	55	22,981
1925	2,480	1,452	2,388	13,289	6,607	116	26,333
1926	3,933	1,421	2,472	13,261	6,934	143	28,162
1927	3,613	346	4,605	16,967	7,179	148	32,858
1928	6,631	1,053	3,603	15,199	6,652	186	33,324
1929	8,045	3,209	2,089	17,671	6,814	115	37,942
1930	9,014	3,363	1,485	16,235	6,605	138	36,840
1931	7,882	2,979	1,019	13,255	5,170	112	30,415
1932	7,565	1,411	1,199	10,139	4,131	117	24,563
1933	8,635	2,097	1,237	13,802	5,400	180	31,351
1934	10,589	2,141	1,180	14,541	6,121	298	34,870

Source: *Mineral Resources of the United States*, (Part II), 1917, p. 1214; 1918, p. 1329; 1928, pp. 521-522. *Monthly Coal Distribution Report*, Numbers 7 and 43 (mimeographed, issued by the United States Bureau of Mines). Totals are based on exact figures, not on rounded numbers. The original data are collected by the Ohio Bureau of Coal Statistics. They are based on railroad records of coal billed from the originating fields, not on receipts at Great Lakes ports.

^a Does not include shipments from the central Pennsylvania district to Buffalo until 1929. These shipments amounted to 170,773 tons in 1929.

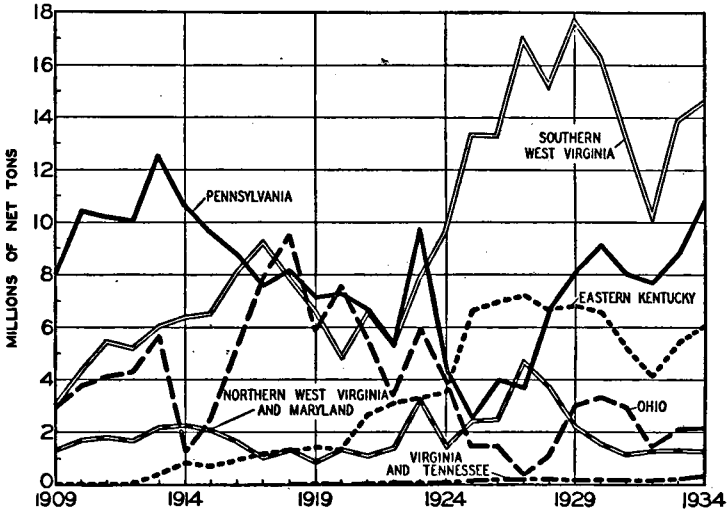
^b Includes the Fairmont, Cumberland-Piedmont, and Moundsville districts.

^c Includes the Kanawha, New River, Pocahontas, Kenova-Thacker, and Winding Gulf districts.

^d Less than 500 tons.

supplying about half the lake cargo coal but was already feeling the effects of the strongly advancing competition from southern West Virginia. That influence may have been intensified by the tendency of the Government, during the War, to route Pennsylvania coal eastward and southern Appalachian coal westward. During the War period, mining wage rates, like other wage rates and other prices, rose a great deal.

Chart 16
**ANNUAL SHIPMENTS OF BITUMINOUS COAL TO GREAT LAKES
 PORTS FOR LOADING INTO VESSELS AS CARGO,
 ACCORDING TO SOURCE, 1909-1934**
 (Data in Table 25)



After the War, as prices fell, widespread disturbances began to arise out of the struggle of the operators to cut wages and the struggle of the laborers to maintain them. In many districts the laborers were organized; in many they were not. Unionization was more prevalent in northern fields than in southern Appalachian fields. The fight of the unions to maintain wage rates was more widely effective in the northern fields than in the fields to the southward, because of the greater extent of organization of labor in northern fields. The Jacksonville agreement, signed in 1924, was a manifestation of the greater strength of northern labor; for a large part of the northern fields were bound by the agreement, whereas the southern Appalachian operators predominantly rejected the agreement.

Whatever other factors, such as mechanization and quality of coal, may have been part of the reason behind the changing competitive position of the respective producing

areas in the focally important Great Lakes trade, the greater ability of southern operators to "adjust" wages, i.e., to let labor share heavily in the burden of reduction of cost, was undoubtedly a powerful influence. As business went more and more to non-union fields, defection from the Jacksonville agreement is generally recognized to have increased; and the agreement was abandoned in 1928. It is commonly assumed that abandonment of the scales of wages carried under that agreement had much to do with the recovery of northern operators in 1928.

The exact effect of the abandonment of the Jacksonville agreement, however, cannot be segregated from an important change in another major competitive factor, namely, freight rates. In August, 1927, the difference between freight rates on lake cargo coal from northern fields and those from southern Appalachian fields was increased from 25 cents to 45 cents. In April, 1928, the differential was reduced to 25 cents; but in June of the same year the differential on shipments for points beyond Detroit was raised again to 45 cents, that on other lake cargo coal remaining at 25 cents. This differential on shipments beyond Detroit was lowered to 35 cents in August, 1928; and in the following January the differential on other lake cargo coal was raised to 35 cents. The net change on lake cargo coal, after these several intermediate adjustments, was to increase from 25 cents to 35 cents the freight-rate differential in favor of northern basing-point fields.

It may be noted that the general tendency in the long struggle over coal rates has been to increase the differential between southern Appalachian fields and northern fields on shipments of lake cargo coal. Before 1912, the differential was 9 cents; from 1912 to 1917, it was 19 cents; thereafter, until 1927, it was 25 cents; and, after the period of intermediate adjustments in 1927-1928, the differential was fixed at 35 cents. (As a percentage of the rate level, however, the differential has not been increased so much as the absolute differential would indicate.) To say that the Pennsylvania area must have a rate advantage in order to stay in the lakes market is, of course, to say that the Pennsylvania area cannot offer an f.o.b. price as low as that offered by competing fields. The snap de-

Table 26
BITUMINOUS COAL DUMPED AT LAKE ERIE PORTS,
ACCORDING TO PORT AND ORIGIN, 1917, 1918, AND 1929
(Thousands of Net Tons)

Year and Origin	Dumped at Lake Erie Ports for Loading into Vessels as Cargo										Dumped for Vessel Fuel, All Ports	
	Toledo	Sandusky	Huron	Lorain	Cleveland	Fairport	Ashtabula	Conneaut	Erie	Buffalo		All Ports
1917												
Central Pennsylvania.....	0	0	0	0	0	0	0	0	0	0	0	0
Western Pennsylvania.....	0	17	474	38	727	255	3,095	2,476	467	•	7,549	924 ^b
Ohio.....	2,899	44	1,349	1,811	1,211	0	252	0	256	•	7,821	553 ^b
Northern West Virginia.....	6	0	0	1,011	0	0	19	0	0	•	1,036	12 ^b
Southern West Virginia.....	5,795	3,434	0	0	0	0	0	0	0	•	9,228	132 ^b
Eastern Kentucky.....	1,189	0	0	0	0	0	0	0	0	•	1,189	21 ^b
Virginia and Tennessee.....	6	0	0	0	0	0	0	0	0	•	6	0
Total.....	9,894	3,494	1,822	2,860	1,938	255	3,366	2,476	723	•	26,829	1,642
1918												
Central Pennsylvania.....	0	0	0	0	0	0	0	0	12	•	12	•
Western Pennsylvania.....	0	0	271	49	1,510	218	2,927	2,215	948	•	8,138	890
Ohio.....	3,214	80	1,795	2,199	1,702	0	339	0	207	•	9,537	571
Northern West Virginia.....	1	0	0	1,092	0	0	170	0	0	•	1,263 ^g	14
Southern West Virginia.....	5,559	2,280	0	0	0	54	0	0	0	•	7,892 ^g	122
Eastern Kentucky.....	1,314	•	0	0	0	0	0	0	0	•	1,315	19
Tennessee.....	•	0	0	0	0	0	0	0	0	•	•	0
Total.....	10,088	2,359	2,066	3,340	3,212	272	3,436	2,215	1,168	•	28,157	1,616
1929												
Central Pennsylvania.....	0	0	0	0	0	0	0	0	171	•	171	5
Western Pennsylvania.....	0	1	339	12	1,214	576	2,788	2,610	333	•	7,874	537 ^j
Ohio.....	202	•	442	1,454	781	0	123	0	196	•	3,198	535
Northern West Virginia.....	0	0	0	798	175	984	127	0	5	•	2,089	95
Southern West Virginia.....	9,940	7,731	0	0	0	0	0	0	0	•	17,671	219
Eastern Kentucky.....	5,417	1,397	0	0	0	0	0	0	0	•	6,814	61
Virginia.....	72	0	0	0	0	0	0	0	0	•	72	0
Tennessee.....	43	0	0	0	0	0	0	0	0	•	43	0
Total.....	15,674	9,130	781	2,265	2,170	1,560	3,039	2,610	534	171	37,933	1,451

Source: The *Coal Trade*, 1920, pp. 98 and 99. *Mineral Resources of the United States* (Part II), 1917, p. 1213; 1918, pp. 1327-1329. Ore and Coal Exchange, for 1929 data. Totals are based on exact figures, not on rounded numbers.

^a Pittsburgh, northern Pennsylvania, and Connellsville districts.

^b Estimated on the basis of shifts between 1917 and 1918 in the tonnage going to each port. See the *Coal Trade*, 1920, pp. 98 and 99.

^c Fairmont, Moundsville, and Cumberland-Piedmont districts. The only shipments from the last mentioned district were 6,307 tons of cargo coal in 1917 and 3,178 tons of cargo coal in 1929.

^d Kanawha, Kenova-Thacker, New River, and Pocahontas districts.

^e Not reported. Tonnage was probably negligible.

^f Less than 500 tons.

^g A transposition in the original data has been corrected.

^h No shipments from Virginia in 1918.

ⁱ Clearfield district.

^j Includes 294 tons from the Altoona-Meyersdale district.

Table 27
TOTAL BITUMINOUS COAL LOADED INTO VESSELS AT EACH
LAKE ERIE PORT, 1916-1934^a
(Thousands of Net Tons)

Year	Cargo and Bunker Coal										Total Cargo Coal	Total Bunker Coal
	Toledo	Sandusky	Huron	Lorain	Cleveland	Fairport	Ashtabula	Conneaut	Erie	Buffalo		
1916	7,539	2,799	1,193	3,666	3,179	523	5,017	1,696	762	‡	24,693	1,681
1917	10,191	3,583	1,894	3,011	2,250	311	3,678	2,744	809	‡	26,829	1,642
1918	10,339	2,448	2,170	3,435	3,534	318	3,699	2,246	1,200	‡	28,153	1,235
1919	7,936	1,442	1,489	2,871	2,801	30	3,874	1,383	925	‡	21,713	1,037
1920	7,484	1,631	1,958	3,488	1,859	0	3,960	2,447	840	‡	22,408	1,259
1921	8,321	1,905	1,623	2,649	2,527	0	3,566	1,495	1,085	‡	22,412	759
1922	7,214	2,894	448	1,928	1,546	0	3,369	1,682	272	‡	18,522	829
1923	9,374	3,104	1,540	3,865	2,843	994	5,877	3,026	835	‡	29,829	1,629
1924	9,448	4,352	837	2,386	1,931	641	2,260	1,712	776	‡	22,975	1,348
1925	14,433	6,306	740	1,745	582	414	1,958	1,339	345	‡	26,331	1,532
1926	14,144	6,976	660	2,222	712	765	1,487	2,154	624	‡	28,159	1,585
1927	16,811	8,189	239	2,867	1,038	1,567	2,315	837	439	‡	32,852	1,451
1928	15,709	6,928	782	2,231	1,062	1,855	3,491	2,050	568	90	33,402	1,364
1929	16,045	9,361	809	2,395	2,285	1,641	3,218	2,825	630	175	37,933	1,451
1930	15,833	7,899	921	2,082	2,017	873	3,603	2,204	2,280	447	36,840	1,321
1931	12,882	6,355	828	1,485	1,640	498	3,337	1,578	2,169	614	30,415	972
1932	10,375	4,518	569	967	1,647	981	3,133	832	1,504	648	24,563	610
1933	14,194	6,017	617	1,135	1,878	924	3,031	1,201	2,183	1,153	31,351	982
1934	15,830	6,175	656	1,071	2,066	895	3,994	1,816	2,299	1,170	34,870	1,102

Source: Data for 1916-1917 are taken from the *Coal Trade*, 1920, pp. 98-99; data for 1918-1930, from *Seward's Annual*, 1919-1931; those for 1931-1934, from the Ore and Coal Exchange, *Lake Coal*, December, 1933, and December, 1934. All the data were collected by the Ore and Coal Exchange.

^a Includes coal loaded for storage at the end of the navigation season in the specified years for shipment at the beginning of the following season. This tonnage seldom amounted to more than 200,000 tons.

^b Not reported. Tonnage was probably negligible.

LAKE SHIPMENTS

cision of many people would be that if a district has such high costs that it cannot stand the competitive gaff it should perish. The answer, however, is not so simple as that. In the major consuming markets, freight rates are more important than f.o.b. prices in delivered cost. If transportation rates are shaped too much by competitive company economy and are not in some rough way shaped to the national economy, the normal economic value of advantageous location is destroyed.

Ports Loading Lake Cargo Coal

Data on coal shipments to and from Lake Erie ports are collected mainly by the Ore and Coal Exchange. The tonnage of coal dumped at each Lake Erie port for loading into vessels as cargo is shown in Table 26. It is apparent from this table that the lake cargo shipments from central Pennsylvania go to Buffalo; those from western Pennsylvania, mainly to Huron, Cleveland, Fairport, Ashtabula, Conneaut, and Erie; those from Ohio, to Toledo, Huron, Lorain, Cleveland, Ashtabula and Erie; those from northern West Virginia, to Lorain, Cleveland, Fairport, and Ashtabula; and all those from southern West Virginia, eastern Kentucky, Virginia, and Tennessee, to Toledo and Sandusky. Data are not presented in Table 26 to show how much of the vessel fuel is dumped at each port but the distribution is similar to that of the cargo tonnage.

Tonnage handled at each port has fluctuated markedly since 1916 (Table 27). Fairport did not handle any of the lake coal in 1920, 1921, or 1922, but in 1927, in 1928, and in 1929 it handled more than 1,500,000 tons. Such violent change must have resulted in the wasteful use of port facilities.

Toledo handled far more coal tonnage than any other lake port. In 1929, loadings at this port accounted for 40.7 per cent of total lake loadings. In the same year loadings at Sandusky were 23.8 per cent of the total, and those at Ashtabula 8.2 per cent, whereas those at Lorain, Cleveland, and Conneaut were each roughly 6 per cent of the total.

All the coal-loading ports except Sandusky handled iron ore destined for inland blast furnaces. Railroads could get a more economical utilization of their equipment if it were possible for them to make the necessary deliveries of coal to Lake

Table 28
BITUMINOUS COAL RECEIPTS AT LOWER LAKE PORTS AND
SHIPMENTS OF IRON ORE FROM THE SAME PORTS TO
INTERIOR FURNACES, 1934
 (Amounts in Thousands of Net Tons)

Port	Receipts of Bituminous Coal	Iron Ore Shipments to Interior Furnaces ^a	Ratio of Iron Ore Tonnage to Coal Tonnage ^b
Ports Handling Mainly Pennsylvania Coal:			
Erie.....	2,299	1,027	% 44.7
Conneaut.....	1,816	3,741	206.0
Ashtabula.....	3,994	2,047	51.3
Ports Handling Mainly Pennsylvania and Northern West Virginia Coal:			
Fairport.....	895	766	85.6
Ports Handling Mainly Pennsylvania, and Ohio Coal:			
Cleveland.....	2,066	2,681	129.8
Huron.....	656	438	66.8
Ports Handling Mainly Ohio and Northern West Virginia Coal:			
Lorain.....	1,071	108	10.1
Ports Handling Almost Entirely Southern West Virginia, Kentucky, Virginia, and Tennessee Coal:			
Sandusky.....	6,175	0	0.0
Toledo.....	15,830	438	2.8
Summary—All Ports.....			
	34,802	11,246	32.3
Erie, Conneaut, and Ashtabula.....	8,109	6,815	84.0
Fairport, Cleveland, and Huron.....	3,617	3,885	107.4
Lorain.....	1,071	108	10.1
Sandusky and Toledo.....	22,005	438	2.0

Source: Reports of the Ore and Coal Exchange.

^a Does not include ore shipped to lake front furnaces. Many of the interior furnaces, however, are only short distances from the ports.

^b For data on a car-mile basis, see Charles Reittel, *Freight Rates on Soft Coal*, The Pennsylvania Industrial Survey, Bulletin Number 2, August 10, 1927, p. 15. The data were taken from I.C.C. Docket 15007.

Erie and then to return with full loads of iron ore. The economic waste of hauling trains of empty cars needs no comment. Nevertheless, utilization of hauling equipment is far from complete. In 1934 the tonnage of iron ore shipped by rail from the Conneaut port and the Cleveland port to inland furnaces exceeded the tonnage receipts of coal; but for each of the other ports on lower Lake Erie, return tonnage of iron ore was considerably smaller than the tonnage receipts of coal (Table 28).²³ For all ports on lower Lake Erie, return tonnage

²³ It should be observed that iron ore is about four times as heavy as coal. There is not, however, a proportionate saving in railroad car requirements for transporting the ore. A carload of ore is seldom more than 50 per cent heavier than a carload of coal, the railroad equipment not being capable of enduring the strain of greater weight.

Although a large amount of coal is shipped to cities along Lake Erie for consumption in those cities, these shipments are not considered in the comparison of ore tonnage with coal tonnage. The comparison for Cleveland would be affected most if these shipments were included.

Table 29
DESTINATION OF BITUMINOUS COAL SHIPPED AS CARGO
ON THE GREAT LAKES, 1918-1934^a
 (Thousands of Net Tons)

Destination and Year	Lake Superior Ports	Sault Ste. Marie and River	Lake Michigan Ports	Lake Huron Ports	Port Huron and Lower River	Lake Erie Ports	Lake Ontario and Saint Lawrence	Total
American Ports								
1918	12,727	588	7,407	407	467	132	0	21,728
1919	9,426	350	6,680	303	348	73	0	17,180
1920	9,330	552	5,460	213	846	65	0	16,477
1921	9,908	336	6,173	232	739	244	0	17,632
1922	6,700	676	5,486	198	613	1,153	0	14,826
1923	13,808	697	8,088	310	768	501	0	24,172
1924	9,539	469	6,551	311	619	735	0	18,223
1925	10,842	618	8,203	342	1,136	923	62	22,125
1926	11,215	643	9,085	426	1,144	706	13	23,232
1927	13,726	612	10,157	497	1,416	1,175	2	27,586
1928	11,433	631	10,561	484	2,530	2,117	2	27,759
1929	12,103	596	12,533	547	3,505	2,654	4	31,943
1930	10,908	495	12,056	796	4,087	2,235	6	30,582
1931	8,582	306	9,216	592	4,524	1,852	51	25,122
1932	6,221	173	7,066	331	4,439	1,727	57	20,014
1933	6,909	298	10,267	522	5,150	2,850	69	26,065
1934	8,569	301	10,912	670	5,317	2,554	76	28,399
Canadian Ports								
1918	2,152	1,143	-----	1,196	538	29	1,367	6,426
1919	1,581	811	-----	741	364	49	988	4,533
1920	1,965	1,092	-----	1,006	443	10	1,415	5,931
1921	2,006	752	-----	766	398	91	767	4,780
1922	1,902	414	-----	574	500	92	214	3,696
1923	2,292	871	-----	980	576	237	519	5,475
1924	2,014	789	-----	645	548	398	507	4,901
1925	807	591	-----	683	653	569	875	4,178
1926	1,106	918	-----	903	701	638	594	4,861
1927	1,461	1,032	-----	938	584	848	453	5,316
1928	1,644	1,126	-----	867	628	1,037	341	5,643
1929	1,752	1,331	-----	886	534	812	693	6,007
1930	1,501	820	-----	995	464	1,157	1,344	6,280
1931	787	496	-----	683	292	1,153	1,920	5,331
1932	763	246	-----	531	305	803	1,829	4,477
1933	654	391	-----	609	476	865	2,319	5,314
1934	762	660	-----	762	475	1,041	2,740	6,440

Source: *Saward's Annual*, 1921-1925, for 1918-1923 data. *Mineral Resources of the United States* (Part II), 1926, p. 510; 1928, p. 521, for 1924-1928 data. *Weekly Coal Report*, Number W.C.R. 655, February, 1930 (mimeographed, issued by the United States Bureau of Mines), for 1929 data. *Monthly Coal Distribution Report* (mimeographed, issued by the United States Bureau of Mines), for 1930-1934 data. The original data were collected by the Ore and Coal Exchange. All totals except those for 1932-1934 are based on exact figures, not on rounded numbers.

^a The data represent tonnage of coal moved from originating ports on Lake Erie. Coal loaded for winter storage at the ports is not included until it is shipped. For total shipments to Canadian and American points combined, see Table 30.

of iron ore in 1934 was only 32.3 per cent of the tonnage receipts of coal for transshipment on the lakes. For ports (Erie, Conneaut, and Ashtabula) handling mainly Pennsylvania coal, the percentage was 84.0; for ports (Fairport, Cleveland, and Huron) handling mainly Pennsylvania, Ohio, and northern West Virginia coal, 107.4; for the one port (Lorain) handling mainly Ohio and northern West Virginia coal, 10.1; and for the ports (Sandusky and Toledo) handling almost entirely

Table 30
**TONNAGE OF BITUMINOUS COAL AND OF IRON ORE
 SHIPPED ON THE GREAT LAKES, 1916-1934**
 (Thousands of Net Tons)

Year	Shipments of Cargo Bituminous Coal from Lake Erie Ports	Bituminous Coal Traffic—Sault Ste. Marie ^a	Receipts of Bituminous Coal, Duluth—Superior Harbor	Shipments of Iron Ore from Lake Superior Ports	Receipts of Iron Ore at Lake Erie Ports and at Detroit
1916	24,693 ^b	13,913	8,172	64,150	58,024
1917	26,829 ^b	15,737	9,239	61,983	54,670
1918	28,153	15,771	9,721	60,908	53,965
1919	21,713	11,462	7,080	47,280	41,914
1920	22,408	12,097	7,393	57,306	51,150
1921	22,412	12,507	8,320	22,953	17,730
1922	18,522	8,791	5,139	42,583	36,421
1923	29,647	16,709	11,268	59,841	49,916
1924	23,124	12,126	7,731	42,984	36,311
1925	26,304	11,974	8,883	54,249	44,404
1926	28,093	12,955	9,169	58,171	48,375
1927	32,902	15,954	11,452	50,671	42,101
1928	33,402	14,044	9,688	54,313	42,516
1929	37,950	15,103	10,330 ^c	65,919	52,349
1930	36,862	13,257	9,342	47,585	36,830
1931	30,453	9,891	7,537	24,483	17,469
1932	24,491	7,187	5,652	3,627	3,258
1933	31,379	7,959	6,179	22,373	18,903
1934	34,839	10,148	7,648	23,191	18,254

Source: The *Coal Trade*, 1918, p. 93, 1919, p. 36, 1920, pp. 98-99, and 1921, p. 144. Various issues of *Saward's Annual. Mineral Resources of the United States*, 1926-1928. *Weekly Coal Report*, Number W.C.R. 705, and *Monthly Coal Distribution Report*, Numbers 6, 30, and 42 (mimeographed, issued by the United States Bureau of Mines). Various issues of the *Annual Statistical Report of the American Iron and Steel Institute. Steel* (trade magazine), December 3, 1934, p. 74, and December 17, 1934, p. 76. The collection agencies for the data are as follows: Ore and Coal Exchange, for shipments of bituminous coal from Lake Erie ports; United States Engineer's Office, Duluth, Minnesota, for bituminous coal receipts at Duluth-Superior Harbor; Lake Superior Iron Ore Association and *Steel* for shipments of iron ore from Lake Superior ports and receipts of iron ore at Lake Erie ports and at Detroit.

^a Includes traffic on both the United States and the Canadian canals. The United States canal usually handles about 99 per cent of the traffic.

^b Loadings of cargo coal, not shipments from the ports.

^c Total receipts at all Lake Superior docks in 1929 were 14,015,050 tons. See *Supplement to Monthly Coal Distribution Report*, Number 3 (mimeographed, issued by the United States Bureau of Mines).

southern West Virginia, eastern Kentucky, Virginia, and Tennessee coal, the percentage of return tonnage was only 2.0 per cent.²⁴ The absence of steel plants in or near the southern Appalachian coal fields makes it necessary for the railroads serving those fields to return their trains from the lake docks at a loss, whereas the steel plants located in or near the northern Appalachian coal fields provide the northern railroads with revenue return-loads. Moreover, all the southern Appalachian coal fields are much farther from the Lake Erie docks than are the Ohio or Pennsylvania fields. The Pittsburgh coal district, for example, is about half as far from the lake as its chief southern Appalachian competitor, the Kanawha district. In spite of the apparent advantages, however, the rate for coal shipments from the Pittsburgh district to the lake docks is only 19.3 per cent lower than the rate for coal shipped from the Kanawha district to the lake docks. The rates are \$1.46 for the Pittsburgh district and \$1.81 for the Kanawha district, there being a differential of 35 cents in favor of the Pittsburgh district.

Consuming Markets for Lake Cargo Coal

After the lake cargo coal shipments leave the Lake Erie docks, most of them travel long distances on the lakes. From one-fourth to one-half the shipments go to Lake Superior ports (Tables 29 and 30). At those ports return loads of iron ore are obtained.²⁵

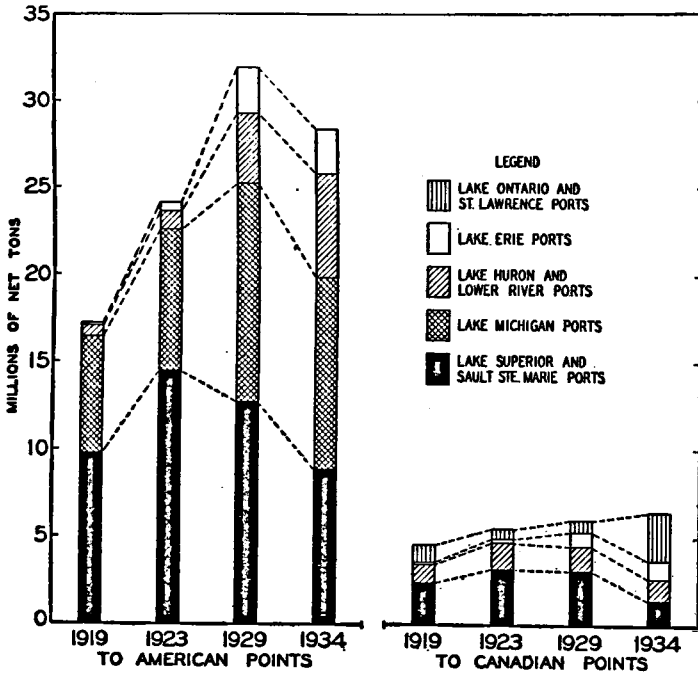
From 1916 to 1934 most of the ore shipments went to lower lake ports (Table 30). Receipts of ore at Lake Erie ports and at Detroit amounted to roughly three-fourths as much as the shipments leaving Lake Superior ports. Except during the current depression, the tonnage of ore received at the lower lake ports exceeded the tonnage of cargo coal shipments from those ports.

²⁴ Of course, it should not be assumed that the ore shipments go to the points of origin of the coal shipments. The percentages, however, give some indication of the volume of return traffic.

²⁵ The tonnage of iron ore loaded on vessels at the Lake Superior ports usually is several times as great as the tonnage of coal received. Space requirements in vessels for the iron ore, however, are not proportionately as great, owing to the fact that the ore has a specific gravity about four times that of coal. Bulk commodities other than coal and ore also are shipped in the lake vessels. For these reasons, it is impossible with available data to determine the extent to which the vessels on the lakes are moved without cargo.

The lake coal shipments, of course, did not all travel to the northwest, and not all of them went to points in the United States. Canada supplied a very stable market for the lake coal (Chart 17 and Table 29). Some of the coal was shipped to Canadian points on Lake Ontario or on the St. Lawrence River; these shipments increased substantially from 1929 to 1934. Some coal was shipped directly across Lake Erie. A negligible tonnage was shipped to American points on Lake Ontario or on the St. Lawrence River. Points on the American side of Lake Erie received a considerable tonnage. Port Huron and lower river points in Michigan provided a rapidly expanding market, which increased even from 1929 to 1934; Canadian

Chart 17
TONNAGE OF BITUMINOUS COAL SHIPPED AS LAKE CARGO TO EACH OF THE GREAT LAKES—1919, 1923, 1929, and 1934
 (Data in Table 29)



points on the opposite shore provided a small but stable outlet. Lake Huron receipts on the American shore were small, but those on the Canadian shore were moderately large. Lake Michigan ports (all in the United States) received large tonnages, and the receipts showed a definitely upward trend during the period 1918-1934. A moderate amount of coal was retained at American and Canadian points on Sault Ste. Marie Straits and the upper river; but a very large tonnage was shipped through the Straits to Lake Superior ports on the American side, and a considerable tonnage was shipped through to ports on the Canadian side. Lake Superior and Lake Michigan ports took from two-thirds to three-fourths of the lake cargo shipments.

Table 31
SHIPMENTS OF LAKE CARGO BITUMINOUS COAL, ACCORDING TO DESTINATION OR USE, 1915, 1917, AND 1929
(Thousands of Net Tons)

Destination or Use	1915	1917	1929
United States:			
Destination Known			
Pennsylvania.....	0	0	42
Illinois.....	1,084	1,050	5,368 ^a
Indiana.....	551	563	^a
Iowa.....	248	272	84
Michigan.....	558	2,727	5,798
Minnesota.....	3,793	4,151	6,843
Nebraska.....	100	55	22
North Dakota.....	553	618	431
South Dakota.....	357	478	495
Montana.....	3	29	1
Oregon.....	1	17	0
Wisconsin.....	4,883	4,485	7,203
New York.....	0	155	2,257
Ohio.....	0	56	359
Washington.....	b	b	b
Idaho.....	1	b	0
Kansas.....	0	b	0
Total.....	12,132	14,656	28,903
Railroad Fuel (Destination Unknown)....	4,546	4,372	4,220
Exported to Canada.....	5,291	7,201	6,028
Change in Stocks.....	- 463	+ 600	- 727
Grand Total.....	21,506	26,829	38,424

Source: *Mineral Resources of the United States*, (Part II), 1915, p. 442; 1917, p. 1216. *Supplement to Monthly Coal Distribution Report*, Number 3 (mimeographed, issued by the United States Bureau of Mines). Totals are based on exact figures, not on rounded numbers.

^a Indiana is included with Illinois.

^b Less than 500 tons.

^c By water from lower lake ports and by rail from upper lake ports.

^d At upper lake docks in the United States.

^e Exclusive of coal distributed from stocks at upper lake docks and of bunker coal taken at upper lake docks. The bunker coal amounted to 395,609 tons in 1929.

It should be understood, of course, that some of the lake coal was reloaded on railroad cars and shipped to points away from the lake. For example, the Dakotas, Iowa, and Nebraska received part of the lake coal. And it is a fair assumption that part of the considerable tonnage of lake coal shown for Minnesota and Wisconsin was shipped inland (Table 31).

In 1915, in 1917, and in 1929, Wisconsin received more of the lake coal than any other state. Minnesota ranked second in each of those years. In 1929, receipts (exclusive of railroad fuel) at various outlets were as follows: 7,203,000 tons in Wisconsin, 6,843,000 tons in Minnesota, 5,798,000 tons in Michigan, 5,368,000 tons in Illinois-Indiana, 2,257,000 tons in New York state, 359,000 tons in Ohio, and 42,000 tons in Pennsylvania.

Railroads took 4,546,000 tons of the lake coal in 1915, 4,372,000 tons in 1917, and 4,220,000 tons in 1929. A small amount of bituminous coal (395,609 tons in 1929) was shipped up the lakes as cargo and loaded in vessels as bunker coal at upper lake docks.

CHAPTER 6

Sources and Distribution of Bituminous Coal Shipped by Atlantic Tidewater

Coal shipped to Atlantic tidewater enters coastwise trade, is exported, or is used as vessel fuel (Chart 18). Tonnage here classified as tidewater shipments includes only coal loaded into vessels as cargo or as vessel fuel at Atlantic ports. It does not include car-ferry shipments.

Shifts among Originating Areas

Shipments of bituminous coal to Atlantic tidewater amounted in 1917 to 37,408,000 tons and in 1929 to 35,157,000 tons (Table 32). In 1929, the Pennsylvania area (including the Panhandle of West Virginia and the Cumberland-Piedmont district in Maryland and West Virginia) originated 10,962,000 tons, or 31.2 per cent, of the coal going to tidewater; and the southern West Virginia area originated 19,609,000 tons, or 55.8

Table 32
SHIPMENTS OF BITUMINOUS COAL TO ATLANTIC TIDEWATER
ACCORDING TO ORIGIN, 1917, 1918, AND 1929

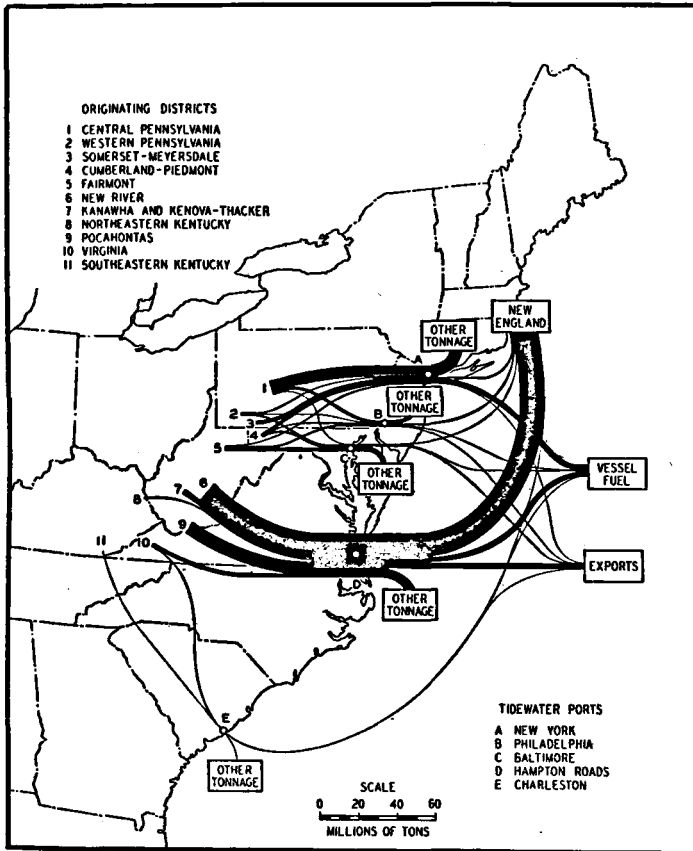
Originating Area ^a	Thousands of Net Tons			Per Cent of Annual Total			Ratio of 1929 Tonnage to 1917 Tonnage
	1917	1918	1929	1917	1918	1929	
Pennsylvania Area:				%	%	%	%
Central Pennsylvania.....	9,550	11,566	5,071	25.5	26.9	14.4	53.1
Western Pennsylvania-Panhandle.....	2,476	2,448	1,516	6.6	5.7	4.3	61.2
Somerset-Meyersdale and Cumberland-Piedmont.....	5,128	6,167	4,375	13.7	14.3	12.4	85.3
Total.....	17,154	20,181	10,962	45.9	46.9	31.2	63.9
Ohio Area.....	36	16	0	0.1	↓	0.0	-----
Northern West Virginia Area	2,699	3,742	2,169	7.2	8.7	6.2	80.4
Southern West Virginia Area..	16,885	18,504	19,609	45.1	43.0	55.8	116.1
Eastern Kentucky-Tennessee Area.....	51	14	749	0.1	↓	2.1	1468.6
Virginia Area.....	583	565	1,668	1.6	1.3	4.7	286.1
Grand Total.....	37,408	43,022	35,157	100.0	100.0	100.0	95.0

Source: *Supplement to Monthly Coal Distribution Report*, Numbers 3, 4, and 6 (mimeographed, issued by the United States Bureau of Mines). Totals are based on exact figures, not on rounded numbers.

^a The areas are described in the Introduction.
^b Less than 0.05 per cent.

per cent. In 1917, the Pennsylvania area and the southern West Virginia area each shipped approximately 17,000,000 tons, or about 45 per cent, of the total Atlantic tidewater coal. From 1917 to 1929 Pennsylvania area bituminous coal entering tide-

Chart 18
TIDEWATER BITUMINOUS COAL SHIPMENTS IN 1929,
ACCORDING TO ORIGIN AND DESTINATION*
 (Data in Tables 32 and 37-40)



*Widths of bands are proportional to the amounts of coal moved.

water shipment decreased 6,192,000 tons, whereas southern West Virginia area coal going to tidewater increased 2,724,000 tons.

The loss was especially serious to central Pennsylvania producers, who supplied 25.5 per cent of the Atlantic tidewater shipments in 1917 but only 14.4 per cent in 1929. The tonnage from central Pennsylvania was only a little more than half as much in 1929 as in 1917. The Somerset-Meyersdale and Cumberland-Piedmont districts shipped 12.4 per cent of the tidewater coal in 1929; the percentage was 13.7 in 1917. Western Pennsylvania-Panhandle mines originated 4.3 per cent of the coal in 1929; the percentage for this district was 6.6 in 1917. On the whole, Pennsylvania and northern West Virginia mines lost tonnage in the tidewater market from 1917 to 1929, but southern West Virginia, Virginia, and eastern Kentucky-Tennessee mines gained in the market during the same years. During the war years 1917 and 1918, Ohio mines shipped small amounts of coal to tidewater; the available data show none from that state in 1929.

Data available for the years 1919-1934 indicate in greater detail the shifts in the origins of tidewater coal. For these data the producing fields are classified as the northern low-volatile (Clearfield, Meyersdale, and Cumberland-Piedmont) fields, the northern high-volatile (Pittsburgh, Greensburg, Westmoreland, and Fairmont) fields, the southern low-volatile (Pocahontas, Tug River, New River, and Winding Gulf) fields, and the southern high-volatile (Thacker, Kenova, Kanawha, eastern Kentucky, and Stonega) fields. (Most of these fields are shown in Chart 2.) Most of the coal going to Atlantic tidewater originated in the coal fields producing low-volatile coal, that is, in the fields lying in the eastern sector of the Appalachian region. In 1919 and 1920 shipments of coal to tidewater from the northern low-volatile fields exceeded those from the southern low-volatile fields (Chart 19 and Table 33). In each year after 1920 the shipments from the southern low-volatile fields were higher than those from the northern low-volatile fields; and they also showed an upward trend, whereas the northern shipments showed a downward trend. Northern high-volatile shipments and southern high-volatile showed similar relationships, except that the shipments from the southern high-volatile fields did not exceed those from the northern high-volatile fields until 1927. Among the northern low-

Table 33
LOADINGS OF BITUMINOUS COAL AT ATLANTIC TIDEWATER PORTS
ACCORDING TO ORIGIN, 1919-1934
(Thousands of Net Tons)

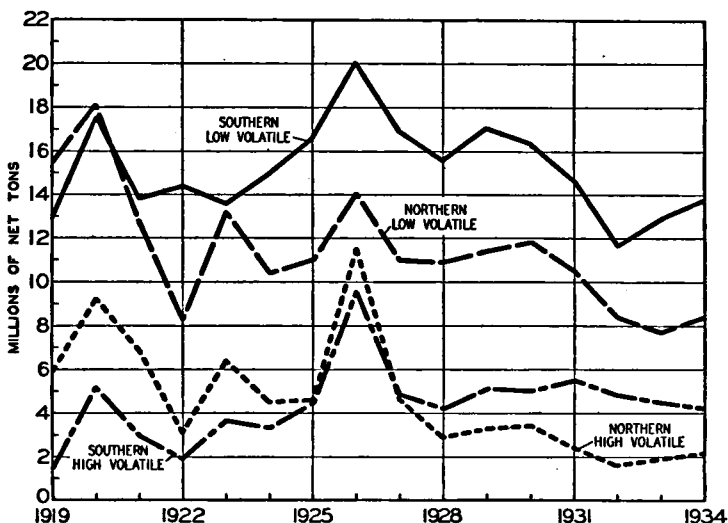
Year	Northern Fields						Southern Fields		Northern and Southern Fields
	High Volatile			Low Volatile			High Volatile ^a	Low Volatile ^b	
	Pittsburgh-Greensburg	West-moreland-Fairmont	Total	Clearfield	Cumberland-Piedmont and Meyersdale	Total			
1919	480	5,322	5,802	10,854	4,539	15,393	1,378	12,950	35,523
1920	823	8,365	9,189	13,037	5,095	18,132	5,175	17,600	50,096
1921	266	6,573	6,840	9,680	3,016	12,696	2,956	13,805	36,297
1922	117	2,995	3,112	5,895	2,347	8,242	1,902	14,401	27,658
1923	148	6,191	6,339	10,445	2,735	13,180	3,658	13,618	36,795
1924	297	4,151	4,448	8,061	2,330	10,392	3,327	14,966	33,132
1925	235	4,371	4,606	7,613	3,411	11,024	4,456	16,601	36,687
1926	499	11,017	11,516	9,847	4,219	14,067	9,586	20,015	55,184
1927	212	4,381	4,593	6,664	4,304	10,968	4,839	16,942	37,342
1928	461	2,416	2,877	6,163	4,718	10,881	4,173	15,593	33,524
1929	563	2,716	3,279	6,892	4,532	11,424	5,117	17,103	36,924
1930	554	2,884	3,437	8,012	3,865	11,877	5,046	16,403	36,763
1931	414	1,992	2,405	7,163	3,382	10,545	5,510	14,678	33,138
1932	257	1,343	1,600	6,105	2,313	8,418	4,822	11,670	26,510
1933	445	1,417	1,862	5,688	2,012	7,699	4,488	12,890	26,940
1934	348	1,799	2,147	6,289	2,133	8,423	4,225	13,753	28,548

Source: Obtained through the Coal Control Association of Western Pennsylvania. The data are based on reports by railroads. They have been converted by the Bureau of Business Research from gross tons to net tons.

^a Includes the Thacker, Kenova, Kanawha, eastern Kentucky, and Stonega fields.

^b Includes the Pocahontas, Tug River, New River, and Winding Gulf fields.

Chart 19
**ANNUAL LOADINGS OF BITUMINOUS COAL AT ATLANTIC
 TIDEWATER, ACCORDING TO ORIGIN, 1919-1934**
 (Data in Table 33)



volatile fields, shipments to tidewater from the Cumberland-Piedmont and Meyersdale fields were maintained at approximately a uniform level from 1919 to 1929 and those from the Clearfield field declined markedly. From the northern high-volatile fields, shipments to tidewater from the Pittsburgh-Greensburg fields were well sustained and those from the Westmoreland-Fairmont fields declined rapidly (Table 33).

Consuming Markets for Tidewater Coal

The annual loadings of bituminous coal at Atlantic tidewater were comparatively steady during the period 1917-1934, with the exception of the loadings for export (Table 34). Consignments to foreign countries varied widely. Exports of bituminous coal from Atlantic tidewater ports were 21,900,000 tons in 1926, when there was a seven-month strike in the British coal mines; and they were only 1,613,000 tons in 1922, when coal strikes were numerous in the United States.²⁶ In 1920 the British Govern-

²⁶ *Coal in 1929*, pp. 792-793.

Table 34
LOADINGS OF BITUMINOUS COAL AT ATLANTIC TIDEWATER
PORTS, ACCORDING TO DESTINATION OR USE, 1917-1934^a
 (Thousands of Net Tons)

Year	Coastwise to New England	Exports	Vessel Fuel ^b	Inside Capes ^c	Other Tonnage ^d	Total
1917	12,268	5,543	8,775	3,009	7,813	37,408
1918	15,651	3,894	11,240 ^e	3,458	8,777	43,021
1919	8,385	8,292	6,874	3,438	10,072 ^a	37,062
1920	10,456	21,778 ^f	9,171	3,410	8,968	53,784
1921	8,859	9,633	8,135	3,251	7,445	37,323
1922	10,892	1,613	4,576	3,332	8,059	28,473
1923	13,374	5,122	5,442	4,460	9,123	37,521
1924	11,488	4,768	4,961	3,753	8,246	33,217
1925	13,463	5,109	5,488	4,348	8,715	37,124
1926	12,949	21,900 ^g	8,545	4,373	9,808	57,574
1927	14,829	3,580	5,709	4,201	9,521	37,839
1928	13,445	2,452	5,534	4,055	9,233	34,718
1929	14,445	2,852	5,507	4,661	10,586	38,051
1930	14,026	2,353	5,093	4,696	11,011	37,179
1931	12,646	1,537	3,510	3,907	11,886	33,486
1932	10,618	411	1,574	2,236	11,939	26,777
1933	11,351	501	1,571	2,634	11,070	27,126
1934	11,751	715	1,545	2,660	12,073	28,743

Source: *The Coal Trade*, 1920, pp. 203-204. *Mineral Resources of the United States* (Part II), 1917, pp. 1209-1212; 1918, pp. 1320-1323; 1926, p. 514; and 1928, p. 524. Various issues of the *Monthly Coal Distribution Report* (mimeographed, issued by the United States Bureau of Mines). Totals are based on exact figures, not on rounded numbers.

^a Shipments through the following ports: New York, Philadelphia, Baltimore, Hampton Roads, and Charleston.

^b Does not include vessel fuel coal taken at New England ports.

^c Does not include any tonnage handled at the New York Harbor.

^d "Other Tonnage" includes shipments from all ports, coastwise to points outside capes other than to New England, and New York loadings shipped to docks within New York Harbor.

^e Includes a considerable tonnage for the Army and Navy transport bunkers.

^f Tonnage was large because of restriction of exports from Great Britain.

^g Tonnage was large because of British coal strikes.

ment limited exports from Great Britain, because of a shortage of coal in the home market. Atlantic tidewater exports from the United States in that year shot up to 21,778,000 tons. In the depression year 1932 the exports were only 411,000 tons. The general trend of exports from the eastern coast was downward during the period 1917-1934.

Loadings of vessel fuel at Atlantic ports showed marked fluctuations, though less marked than the fluctuations in exports. Probably the reasons for the fluctuations in fuel loadings by vessels engaged in foreign trade were similar to the reasons for the fluctuations in the coal export trade. Vessels engaged in domestic trade, however, relied mainly on the American mines

Table 35
SHIPMENTS OF BITUMINOUS COAL (EXCLUSIVE OF EXPORTS
AND RAILROAD AND VESSEL FUEL) BY WAY OF ATLANTIC
TIDEWATER PORTS, ACCORDING TO DESTINATION,
1917, 1918, AND 1929
 (Thousands of Net Tons)

Destination	1917	1918	1929
New England States.....	12,268	15,651	12,714
New York.....	5,795	7,918	8,350
New Jersey.....	1,095	827	2,286
Pennsylvania.....	1,477	1,367	2,182
Delaware.....	164	42	6
Maryland.....	1,656	1,649	2,774
Virginia.....	b	343	168
North Carolina.....	b	0	c
South Carolina.....	b	18	1
Georgia.....	b	0	0
Florida.....	65	108	19
State Unspecified.....	1	0	0
Total.....	22,521	27,923	28,500

Source: *Mineral Resources of the United States* (Part II), 1917, p. 1209, and 1918, p. 1320. *Weekly Coal Report*, Number W.C.R. 653 (mimeographed, issued by the United States Bureau of Mines), for data on export and bunker coal in 1929. Data on tidewater receipts by states in 1929 were obtained by letter from the United States Bureau of Mines. Totals are based on exact figures, not on rounded numbers.

a Includes coal for export and for bunker.

b No data.

c Less than 500 tons.

for their coal, with the result that they were not affected appreciably by the unusual conditions influencing export trade.

Coastwise traffic in bituminous coal along the Atlantic was very steady and showed a tendency to increase after the World War. This traffic, on the average, was about equally divided between that destined for New England points and that destined for other points on the coast.

In 1929 New England received 12,714,000 tons of tidewater coal; New York, 8,350,000 tons; Maryland, 2,774,000 tons; New Jersey, 2,286,000 tons; and Pennsylvania, 2,182,000 tons (Table 35).²⁷ All other receipts at Atlantic port destinations in 1929 amounted to only 194,000 tons. New England, New York, New Jersey, Pennsylvania, and Maryland each received more of the tidewater coal in 1929 than in 1917.

Originating Areas in Relation to Market Areas

It would be desirable to know the portion of tidewater coal receipts in each state originating in each coal-producing field.

²⁷ Exclusive of railroad and vessel fuel.

Data so classified, available only for 1917 and for 1918, are summarized in Exhibit C in Appendix A of this study. The data are significant as supporting material for more recent information indicating indirectly the origins of the tidewater shipments.

A rough estimate of the origins of bituminous coal going to important consuming states or groups of consuming states may be made on the basis of the origins of coal shipped from each port. Five ports along the Atlantic coast handle all the reported tidewater loadings of northern and southern Appalachian bituminous coal. These ports are New York, Philadelphia, Baltimore, Hampton Roads, and Charleston. The three northern ports obtain all their tonnage from Pennsylvania, Maryland, northern West Virginia, and Ohio; Hampton Roads port, from Virginia, southern West Virginia, and eastern Kentucky; Charleston, from Virginia and eastern Kentucky, and probably at times small amounts from other southern states. In 1929, Hampton Roads

Table 36
LOADINGS OF BITUMINOUS COAL AT EACH
ATLANTIC PORT, 1917-1934
(Thousands of Net Tons)

Year	New York	Philadelphia	Baltimore	Hampton Roads	Charleston	Total
1917	13,669	3,186	3,034	17,380	139 ^a	37,408
1918	17,203	3,120	3,615	18,952	131 ^a	43,021
1919	14,234	4,411	3,467	14,629	320	37,062
1920	14,825	6,192	7,831	24,026	911	53,784
1921	11,912	3,641	4,136	17,241	392	37,323
1922	7,439	2,157	1,917	15,627	332	28,473
1923	10,799	3,893	5,058	17,384	376	37,521
1924	9,005	2,877	3,063	18,094	178	33,217
1925	9,230	3,109	3,430	21,113	242	37,124
1926	10,337	5,447	10,353	30,716	722	57,574
1927	9,031	3,232	3,453	21,792	320	37,839
1928	9,217	2,511	2,835	19,969	187	34,718
1929	9,421	2,805	3,290	22,364	172	38,051
1930	9,245	3,397	2,950	21,528	147	37,179
1931	8,585	2,563	2,064	20,210	64	33,486
1932	7,601	1,596	1,028	16,511	41	26,777
1933	6,931	1,562	1,205	17,382	46	27,126
1934	7,401	1,719	1,527	18,007	89	28,743

Source: *Mineral Resources of the United States* (Part II), 1917, pp. 1211-1212, 1918, pp. 1322-1323, 1926, p. 514, and 1928, p. 524, for 1917-1928 data. *Weekly Coal Report*, Number W.C.R. 708, February 7, 1931 (mimeographed, issued by the United States Bureau of Mines), for 1929-1930 data. January issues of the *Monthly Coal Distribution Report* (mimeographed, issued by the United States Bureau of Mines), for 1931-1934 data. Totals are based on exact figures, not on rounded numbers.

^a A Coal originating in the southwestern Virginia, southeastern Kentucky, and Tennessee fields and reported with the aggregate shipments to "South Atlantic and Gulf ports."

handled 58.8 per cent of the total Atlantic tidewater loadings; New York, 24.8 per cent; Baltimore, 8.6 per cent; Philadelphia, 7.4 per cent; and Charleston, 0.5 per cent. These percentages are based on Table 36. The loadings at Charleston were so small that for most purposes they may be ignored. Hampton Roads handled almost all the tidewater tonnage originating in southern West Virginia, Virginia, and eastern Kentucky.

Loadings at the three northern ports showed a declining trend in the post-War period; those at Hampton Roads, an upward trend in the same period (Chart 20). On the whole, therefore, the northern Appalachian coal fields lost tonnage in the tidewater market, and the southern Appalachian fields gained tonnage.

A more detailed picture of the shifts in the tidewater market for Appalachian coal is presented in Tables 37-40. These tables show the origin of the coal handled at each of the four leading Atlantic coal-loading ports in 1917, 1918, and 1929. In addition they show the disposition of the coal handled there in each of the years 1917-1934.

From 1917 to 1929 tidewater tonnage handled at New York harbor decreased from 13,669,000 to 9,421,000 and that at Philadelphia harbor from 3,186,000 to 2,805,000; but the tonnage at

Chart 20
ANNUAL TIDEWATER LOADINGS OF BITUMINOUS COAL,
BY PORTS, 1917-1934
(Data in Table 36)

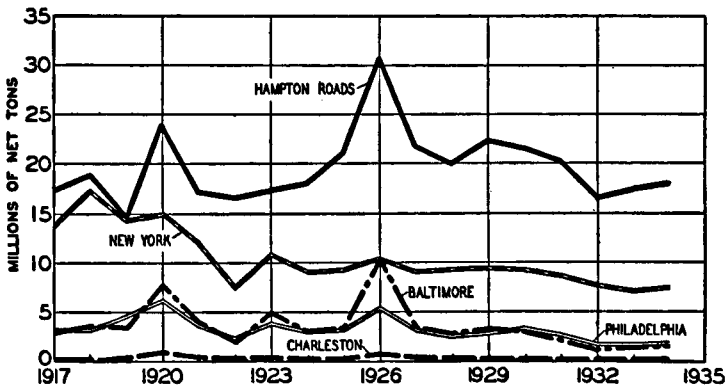


Table 37
LOADINGS OF BITUMINOUS COAL AT NEW YORK HARBOR
BY DESTINATION OR USE AND BY ORIGINATING DISTRICT
(Thousands of Net Tons)

Year	Destination or Use					Total Tonnage
	New England	Exports	Vessel Fuel	Local Use	Other Tonnage ^a	
1917	2,652 ^b	16	4,384	6,617	1	13,669
1918	4,047 ^c	55	4,747 ^d	8,342	10	17,203
1919	2,510	10	2,659	9,054 ^e	•	14,234
1920	2,717	17	3,965	8,126 ^e	•	14,825
1921	1,349	1	3,882	6,680 ^e	•	11,912
1922	826	3	2,158	4,453 ^e	•	7,439
1923	1,607	4	2,705	6,484 ^e	•	10,799
1924	1,017	f	2,097	5,891 ^e	•	9,005
1925	1,026	1	2,299	5,905 ^e	•	9,230
1926	973	30	2,880	6,454 ^e	•	10,337
1927	865	3	2,778	5,385 ^e	•	9,031
1928	729	2	2,840	5,646 ^e	•	9,217
1929	732	3	2,686	6,001 ^e	•	9,421
1930	620	0	2,615	6,010 ^e	•	9,245
1931	472	0	1,906	6,206 ^e	•	8,585
1932	315	f	538	6,748 ^e	•	7,601
1933	314	0	449	6,167 ^e	•	6,931
1934	365	0	424	6,612 ^e	•	7,401

Year	Originating District					All Districts
	Central Pennsylvania	Western Pennsylvania ^g	Somerset-Meyersdale and Cumberland-Piedmont	Fairmont, West Virginia	Eastern Ohio	
1917	8,171	1,432	2,966	1,079	21	13,669
1918	9,575	1,929	4,374	1,321	4	17,203
1929	5,683	359	3,034	344	0	9,421

Source: *The Coal Trade*, 1920, pp. 203-204. *Seward's Annual*, 1921-1924. *Mineral Resources of the United States* (Part II), 1917, 1918, and 1926-1928. *Weekly Coal Report*, Number W.C.R. 653, January 18, 1930, and Number W.C.R. 708, February 7, 1931, and January issues of the *Monthly Coal Distribution Report*, 1932-1935 (mimeographed, issued by the United States Bureau of Mines). Data for 1924-1925 were obtained by letter from the United States Bureau of Mines. The 1929 data on the origin of the coal were obtained through the Coal Control Association of Western Pennsylvania from the records of the Tidewater Bituminous Coal Statistical Bureau; a relatively small quantity of coal of unknown origin was allocated to make the classification of tonnages consistent with that of the United States Bureau of Mines. Totals are based on exact figures, not on rounded numbers.

^a "Other Tonnage" covers shipments to points outside New York Harbor other than to New England.

^b New England tonnage includes "other tonnage."

^c Total tidewater shipments to New England less shipments from ports outside New York.

^d Includes a considerable amount for Army and Navy transport bunkers.

^e Local use includes "other tonnage."

^f Less than 500 tons.

^g Consists of the Pittsburgh, Greensburg, and Westmoreland fields.

Baltimore harbor increased from 3,034,000 to 3,290,000 and that at Hampton Roads harbor from 17,380,000 to 22,364,000.

At each port there were large shifts between 1917 and 1929 in the proportions of the coal originating in each coal-producing district. The central Pennsylvania district supplied 59.8 per cent of the New York harbor tonnage in 1917 and 60.3 per cent in 1929; 30.8 per cent of the Philadelphia harbor tonnage in 1917 and 46.8 per cent in 1929; and 13.9 per cent of the Baltimore

Table 38
LOADINGS OF BITUMINOUS COAL AT PHILADELPHIA HARBOR
BY DESTINATION OR USE AND BY
ORIGINATING DISTRICT
(Thousands of Net Tons)

Year	Destination or Use					Total Tonnage
	New England	Exports	Vessel Fuel	Inside Capes	Other Tonnage ^a	
1917	943 ^b	560	510	1,173	4	3,186
1918	548	91	859 ^c	1,566	56	3,120
1919	492	1,140	677	2,069	32	4,411
1920	809	2,770	662	1,934	16	6,192
1921	520	670	480	1,965	6	3,641
1922	284	156	273	1,438	7	2,157
1923	894	356	458	2,181	4	3,893
1924	512	173	367	1,823	2	2,877
1925	466	224	428	1,986	3	3,108
1926	493	2,254	729	1,958	13	5,447
1927	626	352	360	1,873	21	3,232
1928	534	152	236	1,516	73	2,511
1929	562	233	272	1,697	40	2,805
1930	620	152	220	2,048	267	3,307
1931	449	72	127	1,897	18	2,563
1932	370	7	102	1,049	68	1,596
1933	346	18	121	1,076	1	1,562
1934	406	26	123	1,161	2	1,719

Year	Originating District					All Districts
	Central Pennsylvania	Western Pennsylvania ^d	Somerset-Meyersdale and Cumberland-Piedmont	Fairmont, West Virginia	Eastern Ohio	
1917	982	790	783	616	15	3,186
1918	1,648	400	543	529	0	3,120
1929	1,312	226	532	735	0	2,805

Source: Same as for Table 37. Totals are based on exact figures, not on rounded numbers.

^a "Other Tonnage" covers coastwise shipments outside of capes other than to New England.

^b New England tonnage includes "other tonnage."

^c Includes a considerable amount for Army and Navy transport bunkers.

^d Consists of the Pittsburgh, Greensburg, and Westmoreland fields.

harbor tonnage in 1917 and 9.2 per cent in 1929. The western Pennsylvania district supplied 10.5 per cent of the New York harbor tonnage in 1917 and only 3.8 per cent in 1929; 24.8 per cent of the Philadelphia harbor tonnage in 1917 and only 8.1 per cent in 1929; 7.5 per cent of the Baltimore harbor tonnage in 1917 and 28.3 per cent in 1929. At Hampton Roads harbor, the proportion from Virginia, that from the Kanawha and Kenova-Thacker fields, and that from the eastern Kentucky fields in-

Table 39
LOADINGS OF BITUMINOUS COAL AT BALTIMORE HARBOR
BY DESTINATION OR USE AND BY
ORIGINATING DISTRICT
(Thousands of Net Tons)

Year	Destination or Use					Total Tonnage
	New England	Exports	Vessel Fuel	Inside Capes	Other Tonnage ^a	
1917	1,111 ^b	280	666	976	1	3,034
1918	1,987	120	836 ^c	640	32	3,615
1919	129	1,772	610	776	181	3,467
1920	783	4,951	888	1,168	41	7,831
1921	972	1,646	509	992	17	4,136
1922	606	114	198	960	39	1,917
1923	1,202	1,629	420	1,759	58	5,068
1924	580	671	278	1,503	32	3,063
1925	766	334	302	1,992	36	3,430
1926	977	6,478	967	1,897	33	10,353
1927	748	405	237	2,030	44	3,463
1928	383	196	213	2,007	36	2,835
1929	276	359	262	2,362	31	3,290
1930	407	263	286	1,967	28	2,950
1931	178	167	180	1,516	23	2,064
1932	19	43	77	867	23	1,028
1933	130	23	83	950	19	1,205
1934	318	47	112	1,032	18	1,527

Year	Originating District					All Districts
	Central Pennsylvania	Western Pennsylvania ^d	Somerset-Meyersdale and Cumberland-Piedmont	Fairmont, West Virginia	Eastern Ohio	
1917	421	228	1,379	1,005	1	3,034
1918	343	119	1,249	1,892	12	3,615
1929	303	932	965	1,090	0	3,290

Source: Same as for Table 37. Totals are based on exact figures, not on rounded numbers.

^a "Other Tonnage" covers coastwise shipments outside of capes other than to New England.

^b New England tonnage includes "other tonnage."

^c Includes a considerable amount for Army and Navy transport bunkers.

^d Consists of the Pittsburgh, Greensburg, and Westmoreland fields.

creased; the proportion from the Pocahontas and Tug River fields and that from the New River district declined.

At New York most of the tidewater coal was shipped in vessels to points in or near the harbor or loaded into vessels for fuel; exports accounted for little or none of the tonnage. At Philadelphia and Baltimore the tidewater coal went predominantly to points inside the capes and to New England, but the coal exported or used as vessel fuel was moderately important. At Hampton Roads coal loaded for coastwise shipment to New

Table 40
LOADINGS OF BITUMINOUS COAL AT HAMPTON ROADS
HARBOR, BY DESTINATION OR USE AND BY
ORIGINATING DISTRICT
(Thousands of Net Tons)

Year	Destination or Use					Total Tonnage
	New England	Exports	Vessel Fuel	Inside Capes	Other ^a Tonnage	
1917	8,759 ^b	4,659	3,103	859	4	17,380
1918	9,062	3,607	4,724 ^c	1,249	310	18,952
1919	5,234	5,184	2,837	585	790	14,629
1920	6,142	13,290	3,550	304	740	24,026
1921	6,015	6,989	3,238	291	709	17,241
1922	9,088	1,194	1,895	934	3,515	16,627
1923	9,628	2,863	1,819	520	2,554	17,384
1924	9,376	3,789	2,183	427	2,319	18,094
1925	11,206	4,360	2,407	369	2,771	21,113
1926	10,506	12,552	3,836	518	3,305	30,716
1927	12,590	2,589	2,246	298	4,069	21,792
1928	11,799	2,009	2,153	530	3,478	19,969
1929	12,870	2,163	2,216	601	4,514	22,364
1930	12,380	1,860	1,903	679	4,705	21,528
1931	11,547	1,262	1,269	494	5,638	20,210
1932	9,914	341	838	320	5,098	16,511
1933	10,559	433	901	606	4,883	17,382
1934	10,662	585	863	467	5,429	18,007

Year	Originating District					All Districts
	Pocahontas and Tug River	Virginia	New River	Kanawha and Kenova-Thacker	Eastern Kentucky	
1917	6,288	501	9,202	1,389	0	17,380
1918	7,855	447	9,287	1,363	0	18,952
1929	6,569	1,741	10,882	2,420	750 ^c	22,364

Source: Same as for Table 37. Totals are based on exact figures, not on rounded numbers.

^a "Other Tonnage" covers coastwise shipments outside of capes other than to New England.

^b New England tonnage includes "other tonnage."

^c Includes a considerable amount for Army and Navy transport bunkers.

England usually was far more important than other shipments to American points outside the capes, exports, vessel fuel, or shipments to points inside the capes. In 1920, 1921, and 1926, however, when coal exports from Great Britain were curtailed, exports from Hampton Roads were larger than any other class of coal shipments from that port.

Exports and loadings of vessel fuel at each of the four main tidewater ports showed a downward drift during the period 1917-1934, although from year to year they showed advances and declines so erratic that the long-term movement was difficult to determine.

Hampton Roads gained in the New England tidewater market, the shipments increasing from 5,234,000 tons in 1919, the first post-War year, to 12,870,000 tons in 1929. Annual shipments from Philadelphia harbor to New England were sustained at approximately an unchanging level in the post-War period, although in relation to total deliveries to New England they lost ground. The shipments from Baltimore harbor held up well until the late 1920's, when they declined precipitately; but the shipments from New York harbor declined rather steadily throughout the post-War period. On the whole, therefore, the southern West Virginia, Virginia, and eastern Kentucky mines tremendously increased their share in the New England market served by tidewater; on the other hand, the Pennsylvania, Maryland, and northern West Virginia mines suffered large losses in that market. The loss was doubly severe for the central Pennsylvania and western Pennsylvania-Panhandle mines, because they also lost tonnage in the all-rail shipments to New England (Table 14).

Tidewater loadings at New York harbor for coastwise shipments other than to New England were steady in amount throughout the post-War period. In most of the years, including the current depression years, they were close to 6,000,000 tons. Likewise, the loadings at Philadelphia harbor and those at Hampton Roads harbor consigned to points inside the capes were maintained at a relatively constant volume. The loadings at Baltimore harbor for points inside the capes, however, showed a marked rise, probably because of the expansion of the by-product coke industry in eastern Maryland.

None of the three northern ports shipped large quantities of bituminous coal coastwise a great distance, except to New England. On the other hand, Hampton Roads sent increasing amounts beyond the capes and along the Atlantic shore to destinations not in New England. These shipments grew from 790,000 tons in 1919 to 4,514,000 tons in 1929; they expanded during the current depression, being 5,429,000 tons in 1934. If the data in Table 35 are compared with those in Tables 37-40, it becomes quite evident that Hampton Roads shipped coal by tidewater northward to points in or near the harbors of Baltimore, Philadelphia, and New York. More than 4,000,000 tons of coal loaded at Hampton Roads harbor in 1929 went to Pennsylvania, New York, New Jersey, and Maryland. Eastern Pennsylvania received by way of Hampton Roads in 1929 more than 400,000 tons of the tidewater coal originating in the southern West Virginia, Virginia, and eastern Kentucky mining areas.

The freight rate for coal shipments from the Clearfield district in Pennsylvania to either Philadelphia or Baltimore is \$2.46 per gross ton. That from the New River and Pocahontas districts to Hampton Roads for delivery outside the capes (most of the coal goes outside) is \$2.52 per gross ton. But Clearfield is much closer to either Philadelphia or Baltimore than the New River district or the Pocahontas district is to Hampton Roads; on a mileage basis, the Clearfield coal bears a considerably higher rate. The rate from Clearfield to New York tidewater, for either local or long-distance shipments, is \$2.67 per gross ton, or 15 cents more than the New River-Pocahontas rate to Hampton Roads. The haul from Clearfield to New York is the shorter haul.

CHAPTER 7

Foreign Trade of the United States in Bituminous Coal

Exports

Bituminous coal is exported from the United States by rail to Canada and to Mexico, by the Great Lakes to Canada, and by tidewater to numerous countries, mainly Canada, Italy, Brazil, and the Caribbean countries.²⁸ In occasional years, such as 1920, when the British Government limited exports, and 1921 and 1926, when there were British coal strikes, there have been exports to numerous overseas countries.²⁹ The volume of exports shows considerable fluctuation (Table 41).

Total bituminous coal exports from the United States in 1929 amounted to 17,429,000 net tons, of which 14,645,000 tons went to Canada. Of the total exports, 15,397,000 tons, or 88.3 per cent, originated in the northern and middle Appalachian fields (Table 42).

The bulk of the coal exported to Canada was shipped through border gateways (Table 41). The Ohio customs district handled 45.2 per cent of the exports to Canada in 1929; the Buffalo customs district handled 17.5 per cent; the Rochester district, 14.6 per cent; the St. Lawrence district, 7.2 per cent; and the Michigan district, 13.4 per cent. No other important coal-producing state except Ohio is as close as Pennsylvania to these gateways.

In 1915, all-rail exports of bituminous coal produced in Pennsylvania amounted to 3,866,000 net tons out of 3,970,000 tons from all northern and southern Appalachian fields (Table 42). By 1929, however, rail exports of Pennsylvania bituminous coal had fallen to 3,240,000 tons, but total rail exports of northern and southern Appalachian bituminous coal had risen to 6,537,000 tons.

No data are available for recent years showing the total amount of bituminous coal exports originated by each state. Data

²⁸ *Coal in 1929*, pp. 788-795.

²⁹ *Ibid.*, p. 792.

Table 41
EXPORTS OF BITUMINOUS COAL FROM CUSTOMS DISTRICTS ON THE CANADIAN BORDER,
TOTAL EXPORTS TO CANADA, AND TOTAL EXPORTS TO OTHER COUNTRIES, 1915-1934^a
 (Thousands of Net Tons)

Year	Customs Districts on the Canadian Border							Total Exports to Canada	Total Exports to Other Countries	Total Exports
	Lake Erie Ports, Ohio ^b	Maine, New Hampshire and Vermont	Saint Lawrence	Rochester ^c	Buffalo	Michigan	Western Districts ^d			
1915	5,205	5	300	646	2,486	613	87	9,357	9,420	18,777
1916	6,756	45	1,138	1,467	2,771	924	132	13,260	7,994	21,255
1917	7,460	283	3,031	1,596	3,273	1,921	492	18,117	5,722	23,840
1918	8,133	141	2,509	1,206	4,022	2,058	52	18,134	4,216	22,351
1919	5,892	59	1,764	547	2,457	1,135	87	11,950	8,164	20,114
1920	7,161	73	2,482	1,007	3,605	1,782	115	16,230	22,287 ^e	38,517 ^e
1921	5,836	31	2,149	469	3,278	1,341	185	13,397	9,734 ^f	23,131 ^f
1922	4,281	8	1,427	505	3,014	1,400	88	10,836	1,577	12,413
1923	6,991	27	2,782	734	3,868	1,926	150	16,854	4,599	21,454
1924	5,766	9	1,430	637	2,988	1,285	172	12,655	4,445	17,100
1925	5,244	45	1,549	572	2,569	2,088	177	13,421	4,041	17,462
1926	5,731	56	1,502	799	2,819	2,290	188	13,634	21,638 ^f	35,272 ^f
1927	6,224	46	1,777	782	2,951	2,303	195	14,594	3,417	18,012
1928	6,602	34	1,290	1,521	2,291	1,882	133	13,959	2,206	16,164
1929	6,616	54	1,059	2,144	2,557	1,960	77	14,645	2,784	17,429
1930	6,745	46	812	1,653	2,537	1,603	56	13,603	2,274	15,877
1931	5,283	8	703	1,131	2,279	1,141	38	10,631	1,495	12,126
1932	4,436	1	417	754	1,882	891	26	8,427	387	8,814
1933	4,947	1	303	678	1,733	900	16	8,599	438	9,037
1934	-----	----	-----	-----	-----	-----	----	10,210 ^g	657	10,867

Source: *Mineral Resources of the United States* (Part II), 1917, pp. 1246-1248; 1918, pp. 1358-1359; 1923, pp. 638-639; 1927, pp. 450-452; and 1930, pp. 696-697. *Statistical Appendix to Minerals Yearbook, 1932-1933*, pp. 419-420; and 1934, p. 318. *Survey of Current Business*, March, 1935, p. 43. *Monthly Coal Distribution Report* Number 42 (mimeographed, issued by the United States Bureau of Mines). Totals are based on exact figures, not on rounded numbers.

^a Includes exports from Alaska and Puerto Rico.

^b Consists of the following lower lake docks: Toledo, Sandusky, Huron, Lorain, Cleveland, Fairport, Ashtabula, Conneaut, and Erie.

^c Both rail-car ferry and Lake Ontario.

^d Consists of the following districts: Duluth, Superior-International Falls, Dakota, and Montana-Idaho.

^e Tonnage was large because of restrictions on exports from Great Britain.

^f Tonnage was large because of British coal strikes.

^g Includes 2,000 tons estimated exports to Mexico.

available for 1915 show that total exports originating in Pennsylvania amounted to 8,279,718 tons; those in Ohio, 663,811 tons; those in Maryland, 515,538 tons; and those in West Virginia and Virginia, 8,951,844 tons (footnote to Table 42).

Table 42
EXPORTS OF BITUMINOUS COAL FROM THE NORTHERN AND SOUTHERN APPALACHIAN FIELDS, ACCORDING TO ORIGIN, 1915, 1917, 1918, AND 1929
 (Thousands of Net Tons)

Source of Coal	1915 ^a	1917	1918	1929
All-Rail Exports (by Districts or Groups of Districts)				
Central Pennsylvania.....	No Data	3,945 ^b	4,345 ^b	1,691
Western Pennsylvania and Panhandle.....	No Data	3,378	3,462	1,616
Somerset-Meyersdale and Cumberland-Piedmont.....	No Data	7	^c	20
Total, Pennsylvania Area.....	No Data	7,330 ^b	7,807 ^b	3,327
Northern Ohio.....	No Data	1,921	2,156	1,478
Southern Ohio.....	No Data	106	221	3
Fairmont, West Virginia.....	No Data	130	155	898
Southern West Virginia.....	No Data	355	484	491
Other Districts.....	No Data	44	128	340
Total, All-Rail.....	3,970	9,886 ^b	10,951 ^b	6,537
Great Lakes Exports ^f	5,291	7,201 ^b	6,426 ^g	6,028
Tidewater Exports ^h	9,146	5,528	3,867	2,832
Grand Total Exports.....	18,407	22,615	21,244	15,397
All-Rail Exports (by States):				
Pennsylvania.....	3,866	No Data	No Data	3,240
Maryland.....	0	No Data	No Data	5 ⁱ
Ohio.....	61	No Data	No Data	1,481
West Virginia.....	43	No Data	No Data	1,471 ^j
Other States.....	0	No Data	No Data	340 ^k
Total, All-Rail.....	3,970	No Data	No Data	6,537

Source: *Mineral Resources of the United States* (Part II), 1915, pp. 442, 452-462, and 467; 1917, pp. 1207 and 1216; 1918, pp. 1335-1349 and 1360; and 1929, p. 795. *Supplement to Monthly Coal Distribution Report*, Numbers 3, 4 and 6 (mimeographed, issued by the United States Bureau of Mines). *Soward's Annual*, 1921, p. 248.

^a Exports of bituminous coal by all forms of transportation from five states in 1915 were as follows:

	Net Tons
Pennsylvania	8,279,718
Ohio	663,811
Maryland	515,538
West Virginia and Virginia	8,951,844

^b Exports to Canada from central Pennsylvania by way of Lake Ontario are included in rail exports.

^c Less than 500 tons.

^d Consists of the New River, Winding Gulf, Pocahontas, Tug River, Kanawha, Logan, and Kenova-Thacker districts.

^e Consists of the northeastern Kentucky, McRoberts, Hazard, southeastern Kentucky, Harlan-Benham, Tennessee, Georgia, and Virginia districts.

^f For destination of Great Lakes exports to Canada, see Table 29.

^g Exports from the lower lake ports as reported by the Ore and Coal Exchange. Does not include a small amount of exports by rail from the upper lake ports, nor exports by way of Lake Ontario.

^h As compiled by the Bureau of Mines from the records of the Bureau of Foreign and Domestic Commerce. Includes exports from the New York, Philadelphia, Maryland, Virginia, and South Carolina customs districts.

ⁱ Cumberland-Piedmont district.

^j Southern West Virginia as defined in footnote (d) plus the Fairmont and Panhandle districts.

In 1915, exports from the northern and southern Appalachian fields by way of the Great Lakes and exports by way of Atlantic tidewater ports were each larger than total all-rail exports, but in 1929 all-rail exports were the larger (Table 42). Exports by way of Atlantic tidewater were less than a third as much in 1929 as in 1915, the tonnage being 9,146,000 in 1915 and 2,832,000 in 1929. Those by way of the Great Lakes increased 737,000 tons, or from 5,291,000 tons in 1915 to 6,028,000 tons in 1929.

It is certain that only a very small portion of the bituminous coal exported through Atlantic tidewater ports from 1927 to 1934 came from Pennsylvania. In 1929, for example, total Atlantic tidewater exports amounted to 2,832,000 tons, and, of this, 2,169,000 tons went through the Virginia customs district (Table 43). None of the coal going through the Virginia customs dis-

Table 43
EXPORTS OF BITUMINOUS COAL FROM ATLANTIC
CUSTOMS DISTRICTS, 1915-1934^a
(Thousands of Net Tons)

Year	New York	Philadelphia	Maryland	Virginia	South Carolina	Total
1915	37	1,167	2,130	5,805	7	9,146
1916	47	994	981	5,696	64	7,782
1917	16	560	280	4,659	13	5,528
1918	55	56	120	3,620	16	3,867
1919	33	1,136	1,923	4,681	175	7,948
1920 ^b	283	2,756	4,933	12,756	742	21,470
1921 ^c	69	687	1,644	6,740	337	9,477
1922	9	141	104	1,125	137	1,516
1923	17	340	1,590	2,610	262	4,819
1924	34	165	654	3,632	136	4,621
1925	16	195	337	4,260	186	4,994
1926 ^c	109	2,224	6,466	12,205	581	21,585
1927	11	340	392	2,588	231	3,562
1928	10	123	194	1,858	93	2,278
1929	12	199	358	2,169	94	2,832
1930	3	133	260	1,844	78	2,318
1931	1	57	160	1,234	36	1,488
1932	^d	6	33	331	20	390
1933	^d	12	16	379	27	434
1934	0	26	47	585	56	714

Source: *Mineral Resources of the United States* (Part II), 1917, p. 249; 1918, p. 1360; 1923, p. 639; 1927, p. 452; 1930, p. 697. *Statistical Appendix to Mineral Yearbook, 1932-1933*, p. 420; 1934, p. 318. The data for 1915-1933 are compiled by the United States Bureau of Mines from the records of the Bureau of Foreign and Domestic Commerce; those for 1934 are collected by the U. S. Bureau of Mines and reported in the Monthly Coal Distribution Report, Number 30 (mimeographed).

^a Excludes exports from New England and Georgia. Bunker coal is not included in any year.

^b Exports were large because of restrictions on exports from Great Britain.

^c Exports were large because of British coal strikes.

^d Less than 500 tons.

Table 44
IMPORTS OF BITUMINOUS COAL TO THE UNITED STATES
BY ORIGIN AND BY DESTINATION OR USE
 (Thousands of Net Tons)

Year	District of Entry			Country of Origin		Total Imports ^a
	New England States	Washington, Idaho, and Montana	Other Districts ^b	Canada	Other Countries	
1916	565	711	438	1,568	146	1,714
1917	425	583	440	1,401	48	1,448
1918	407	771	279	1,401	56	1,457
1919	24	809	178	924	87	1,012
1920	67	973	205	1,124	121	1,245
1921	26	1,051	180	1,092	165	1,258
1922 ^d	2,258	962	1,840	1,555	3,505	5,060
1923	687	721	474	1,100	783	1,882
1924	47	250	120	317	100	417
1925	36	457	109	528	74	602
1926	60	339	87	407	78	486
1927	50	428	73	498	52	550
1928	77	384	86	463	84	547
1929	46	373	77	456	39	495
1930	29	177	34	237	4	241
1931	65	115	27	203	3	206
1932	59	95	33	175	12	187
1933	105	58	39	161	41	203
1934	-----	----	----	----	----	180

Destination or Use	Year and Route				1929
	1917	1918			
		Rail or Lake	Tide-water	Total	
Destination Known:					
New England States.....	120	10	174	185	46
New York.....	3	2	15	16	4
Pennsylvania.....	1	0	1	1	0
Illinois-Indiana.....	10 ^c	14 ^c	0	14 ^c	#
Washington, Idaho, and Montana.....	303	309	13 ^e	322	149
Oregon-California.....	44	0	19	19	1
Other States.....	7	7	13	20	19
Total ^f	488	342	235	576	219-
Destination Unknown:					
Railroad Fuel.....	586	449	199 ^g	648	224 ^h
Bunker Coal.....	252	0	102	102	0
Grand Total ^f	1,327 ⁱ	791	535	1,326	443

Sources: *Mineral Resources of the United States (Part II), 1917-1931. Statistical Appendix to Minerals Yearbook, 1932-1934.* Data on destination or use for 1929, by letter from the United States Bureau of Mines. Data on imports from Canada and other countries, 1916-1918, from United States Bureau of Foreign and Domestic Commerce, *Monthly Summary of Foreign Commerce*, December, 1918, p. 12, December, 1934, p. 25; data were converted from gross tons to net tons.

^a Including Alaska, Hawaii, and Puerto Rico.

^b Imports were large because of strikes in the Appalachian and Illinois-Indiana fields.

^c Illinois only.

^d Less than 500 tons.

^e Washington only.

^f Excluding Alaska, Hawaii, and Puerto Rico.

^g All received in New England. See *Coal in 1918*, p. 1320.

^h Consists of 18,983 tons to Idaho and 204,814 tons to Montana.

ⁱ Includes 227 tons of coal re-exported.

trict originated in Pennsylvania (Table 40). Pennsylvania shipped large tonnages of bituminous coal to the New York and Philadelphia harbors, but neither of these was a significant export outlet for bituminous coal (Tables 37-38). Although a somewhat larger export tonnage was handled in the Maryland customs district, a large share of that originated in western Maryland and northern West Virginia (Table 39).

Imports

Imports of bituminous coal are not an important factor in the eastern coal market. In 1929, less than one-half million tons were imported into the United States, including Alaska, Hawaii, and Puerto Rico (Table 44). A large percentage of the imported coal was brought into Washington, Idaho, and Montana. Railroads in the Northwest were leading consumers of the imported fuel. A small amount of coal was imported by New England consumers.

There has been only one year since 1916 when a sizeable quantity of coal came into this country from countries other than Canada; that was in 1922, when there were prolonged strikes in the Appalachian fields and in the Illinois-Indiana fields.

CHAPTER 8

Changes in Bituminous Coal Requirements of Major Groups of Consumers

In the country as a whole, annual consumption of bituminous coal is closely related to annual production; variations in storage and in exports have only a small effect. Reliable annual data on production are available. These data suggest that coal consumption has shown increasing retardation during the past 30 years, that a condition of no growth was reached soon after the World War, and that there has probably been a slight downward drift since the middle 1920's (Chart 4).

Fourteen northeastern states use a large proportion of the bituminous coal consumed in this country. In 1917 these states accounted for 67 per cent of total bituminous coal consumption exclusive of that used as railroad and vessel fuel; in 1929, for 71 per cent (Table 45). In each of the years Pennsylvania consumed more coal than any other state. The share of the state in the nation's total (excluding railroad and vessel fuel) declined markedly during the period, being 21 per cent in 1917 and only 16 per cent in 1929. No data on total consumption by states are available for other years; the data for 1917 and 1929, however, probably give a reliable indication of relative tendencies. These data indicate that the 14 northeastern states, which provide markets for most of Pennsylvania's coal, accounted for an increasing share of bituminous coal consumption in the United States from 1917 to 1929; Pennsylvania, which uses predominantly Pennsylvania coal, accounted for a decreasing share of the consumption during the same period.

Although there has been neither a marked general upswing nor a marked general downswing in bituminous coal consumption in the United States during the post-War period, there have been marked differences among industries and among areas in the trends of consumption. Available data reflecting on these trends will be given consideration, inasmuch as they help to explain changes in the demand for Pennsylvania coal.

Table 45
BITUMINOUS COAL CONSUMPTION (EXCLUSIVE OF LOCOMOTIVE AND VESSEL FUEL)
IN PENNSYLVANIA AND IN FOURTEEN NORTHEASTERN STATES, 1917 AND 1929
AND IN THE UNITED STATES, 1917, 1923, AND 1929

(Thousands of Net Tons)

Use	Pennsylvania		14 Northeastern States ^a		United States		
	1917	1929	1917	1929	1917	1923	1929
Steam and Heat at Coal Mines.....	3,500	1,096	7,326	2,565	12,117	8,765	4,662
Other Mines (and Quarries).....	b	212	b	2,010	b	4,190	4,272
Total, Mines and Quarries.....	c	1,308	c	4,575	c	12,955	8,934
Manufacture of Beehive Coke.....	36,595	8,111 ^d	36,820	8,196	52,247	30,085	10,028
Manufacture of By-Product Coke.....	5,716	21,644	24,185	62,718 ^e	31,506	54,280	76,759
Used in Gas Making ^f	261	183 ^g	3,419	7,414 ^g	4,960	6,238 ^g	8,918 ^g
Other Manufacturing ^h	b	21,324	b	89,831	b	134,428	118,320
Total, Manufacturing.....	c	51,262 ⁱ	c	168,159 ⁱ	c	225,031 ⁱ	214,025 ⁱ
Electric Public Utilities.....	2,486	4,083	21,851	32,057	31,693	36,800	42,785
Domestic Use.....	1,836	j	28,450	j	57,104	66,400	j
All Other Uses (Excluding Locomotive and Vessel Fuel) ^k	29,720 ^l	7,210 ^j	127,748 ^l	75,247 ^j	185,722 ^l	32,779	127,517 ^j
Grand Total.....	80,114	63,863 ^l	49,799	280,038 ^l	375,349 ^m	373,965	393,261

Source: *Mineral Resources of the United States* (Part II), 1917, p. 1254; 1926, p. 500; 1927, p. 423; 1929, pp. 577 and 774-775; 1930, pp. 677-678. *Census of Manufactures*, 1923, pp. 735 and 1197; and 1929, Vol. I, p. 160, Vol. II, p. 760, and Vol. III, various pages. *Supplement to Monthly Coal Distribution Report*, Numbers 1, 3, 4, and 6 (mimeographed, issued by the United States Bureau of Mines). Unpublished data on tidewater receipts and imports from the Bureau of Mines.

^a Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Ohio, Michigan, Indiana, Illinois, and Wisconsin. These states are designated by the United States Bureau of the Census as the New England, Middle Atlantic, and East North Central States.

^b Consumption of "other mines" and of "other manufacturing" is included in "all other uses" in 1917. Imported coal amounting to 488,083 tons and storage coal amounting to 1,253,000 tons are included in "all other uses" for the 14 northeastern states and for the United States in 1917.

^c No data.

^d Excludes estimated consumption of 84,342 tons for Ohio which was included in the data for Pennsylvania. The tonnage for Ohio was estimated, by the authors, on the basis of the number of ovens.

^e Includes estimated consumption of 1,022,258 tons for Wisconsin. This figure was estimated, by the authors, on the basis of the number of ovens.

^f Does not include coal for boiler, retort, or bench fuel. The data for 1917 cover coal gas, whereas those for 1923 and 1929 cover all kinds of manufactured gas delivered through mains for illumination and heat.

^g From the Census of Manufactures. The census data run somewhat higher than those of the United States Bureau of Mines.

^h Total coal for manufacturing less coal for the manufacture of coke and of gas.

ⁱ As reported by the Census of Manufactures. Somewhat low because establishments having value of product less than \$5,000 are excluded.

^j "Domestic Use" and "All Other Uses" were combined in 1929, no separate figures being available.

^k Remainder after subtracting known items.

^l Receipts of coal rather than actual consumption; differs from consumption in so far as stocks of coal were increased or decreased during the year.

^m 385,991,888 tons less 1,643,000 tons vessel fuel used on the Great Lakes plus 11,000,000 tons (estimated) railroad fuel not used by locomotives. See *Coal in 1927*, p. 1254.

Relative Importance of Major Groups of Coal Consumers

The great predominance of industry and transportation in total consumption is apparent from Tables 45 and 46. Transportation fuel can be considered by source and will be so considered in later sections; but it cannot be allocated to specific areas of consumption. The major classes of industrial consumption that can be more or less related to market areas are dealt with in Chart 21. In that chart is shown for 1929 the percentage distribution of total bituminous coal consumption, other than railroad, vessel, and domestic, according to industry. The data are shown for Pennsylvania, 14 northeastern states, and the United States. It will be noted that in Pennsylvania more than half of the total coal consumed, other than in the excluded groups, is used in the manufacture of coke. In the 14 northeastern states and in the United States approximately a third is used in the

Chart 21

PERCENTAGE DISTRIBUTION OF BITUMINOUS COAL CONSUMPTION—EXCLUSIVE OF RAILROAD, VESSEL, AND DOMESTIC—ACCORDING TO INDUSTRY, 1929: PENNSYLVANIA, 14 NORTHEASTERN STATES, AND UNITED STATES

(Based on Table 45)

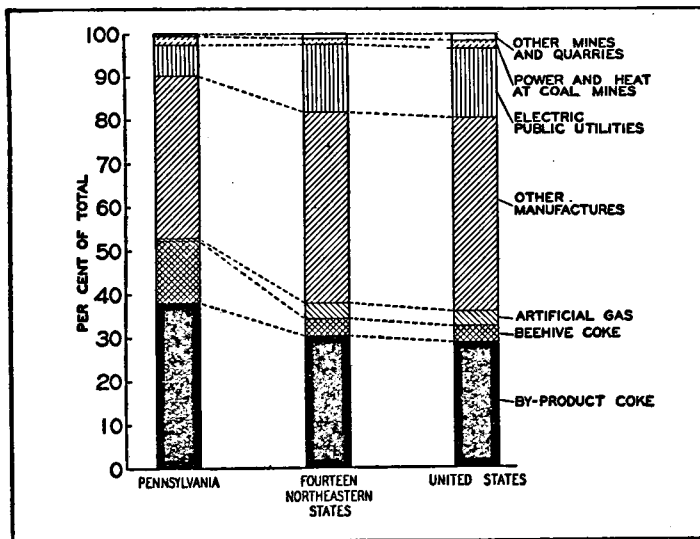


Table 46

**CONSUMPTION OF BITUMINOUS COAL BY MANUFACTURING
INDUSTRIES IN PENNSYLVANIA AND IN FOURTEEN
NORTHEASTERN STATES AND BY ALL CLASSES
OF CONSUMERS IN THE UNITED STATES
1909, 1914, 1919, 1923, AND 1929**
(Thousands of Net Tons)

Area and Industry	1909	1914	1919	1923	1929
Pennsylvania:					
Manufacturing.....	56,853	54,141	58,572	65,568	51,262
Coke Industry.....	36,984	30,287	30,957	38,585	29,755 ^a
Other Manufacturing ^b	19,869	23,854	27,615	26,983	21,507
14 Northeastern States:					
Manufacturing.....	118,143	126,193	156,832	176,020	168,159
Coke Industry ^c	41,359	38,704	51,618	67,994	70,914
Other Manufacturing ^d	76,784	87,489	105,214	108,026	97,245
United States:					
Manufacturing.....	162,600	166,500	203,000	226,700	214,025
Coke Industry.....	59,400	51,600	65,600	84,400	86,787
Other Manufacturing.....	103,200	114,900	137,400	142,300	127,238
Iron and Steel.....	20,900	22,200	28,200	30,200	23,031
Coal and Water Gas Plants.....	3,800	4,400	4,400	4,900	5,274 ^f
Miscellaneous Manufacturing.....	78,500	88,300	104,800	107,200	98,933
Non-Manufacturing.....					
Electric Public Utilities.....	207,700	242,300	278,600	292,300	305,530
Locomotive Fuel, All Steam Roads.....	18,700	24,600	32,000	35,500	42,785
Bunkers, Vessels in Foreign Trade.....	106,000	117,000	124,700	137,000	118,600
Colliery Fuel.....	6,800	8,200	8,200	5,000	4,287
Local Sales at Mines, not Shipped ^g	9,500	10,400	11,100	8,800	4,662
Domestic and All Other ^h	12,000	13,000	18,100	22,100	23,263
.....	54,700	69,100	84,500	83,900	111,933
Grand Total, United States.....	370,300	408,800	481,600	519,000	519,555

Source: *Census of Manufactures, 1929*, Vol. III, for state data on consumption by all manufacturing industries in each year and Vol. I, for data on consumption by all manufacturing industries in the United States in 1929. *Mineral Resources of the United States* (especially 1927, Part II, p. 423) and *Statistical Appendix to Minerals Yearbook* (especially 1934, p. 310), for all other data. The data published by the United States Bureau of Mines were gathered from various sources.

^a Excludes estimated consumption of 84,342 tons for Ohio which was included with the data for Pennsylvania. The tonnage for Ohio was estimated on the basis of the number of ovens.

^b Consumption of all manufacturing industries minus estimated consumption of the coke industry.

^c Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Ohio, Michigan, Indiana, Illinois, and Wisconsin. The states are designated by the United States Bureau of the Census as the New England, Middle Atlantic, and East North Central States.

^d Partly estimated. The original data were incomplete for several states having a small production. The production for those states was estimated (by the authors) by allocation of production according to the number of ovens.

^e Gas coal and steam coal. Figures include all coal except that charged into coke ovens.

^f Bituminous coal used for gas-making and for boiler, retort, and bench fuel, not including that charged into by-product coke ovens operated by city gas companies. For the previous years listed, coal for gas-making only was given.

^g Includes coal used by mine employees and sold for domestic purposes in the vicinity of the mine; also an unknown amount taken by locomotive tenders at the tippie or sold to a nearby factory or power plant. Some overlapping with other items is involved.

^h Obtained by subtracting the known items from the known total. Because of this procedure, the figures are affected by errors in the subtracted items.

manufacture of coke. Artificial gas manufacturing uses a fair proportion of coal in the United States and in the 14 northeastern states, but it is of little relative importance in Pennsylvania. Other manufacturing used a large proportion of the coal consumed—considerably more than the coke industry—in the United States and in the northeastern states. The proportion used in other manufacturing in Pennsylvania was substantial but somewhat smaller. Consumption by electric utilities was of less importance in Pennsylvania than in the combined northeastern states and the entire country. Consumption by mines and quarries was of relatively little importance in Pennsylvania as well as in the combined northeastern states and in the United States.

Data on the consumption of coal by railroads and vessels cannot be secured by states in any year, and no recent data are available on domestic consumption by states. For the nation as a whole, data on consumption by railroads and by vessels engaged in foreign trade are available for 1929 (Table 46). Locomotive fuel for the steam railroads of the country accounted for more than one-fifth of the total consumption of coal in 1929. This proportion can be contrasted with that of manufacturing industries, which as a group consumed two-fifths of the total. The coke industry, the largest manufacturing consumer of coal, consumed about two-thirds as much as was used for locomotive fuel. It is probable that domestic (dwelling) use of coal was not half as large as railroad use. Coal used by vessels in foreign trade amounted to less than one per cent of the coal used by the country.

Consumption in Manufacturing

Manufacturing industries as a group consumed 162,600,000 tons of bituminous coal in 1909, 203,000,000 tons in 1919, and 214,025,000 tons in 1929. The trend in manufacturing consumption, as indicated by the data for 1909, 1914, 1919, and 1923, was upward, but from 1923 to 1929 it was downward. Bituminous coal used for producing gas and steam in iron and steel plants showed similar changes. The consumption by the coke industry and probably also by the artificial gas industry increased from 1923 to 1929, as well as during the earlier years. The shift from the beehive method of coking to the by-product method enabled

manufacturing plants, especially iron and steel plants, to use gas from by-product ovens. When the beehive method was used, the gases were allowed to escape into the air. Conservation of energy through the by-product method accordingly reduced the amount of coal required per unit of work.

Manufacturing plants also used increasing amounts of purchased electrical energy. The horsepower of installed electric motors driven by purchased energy in these establishments more than doubled from 1919 to 1929.³⁰ The horsepower of steam engines and steam turbines in the plants, however, showed practically no change during the period. Part of the increased coal consumption by central electric power plants, therefore, was attributable to increased consumption of purchased power by manufacturing plants.

A predominant share of the manufacturing consumption of bituminous coal is in the northeastern part of the country, within easy reach of the Pennsylvania coal fields. In 1929, states east of the Mississippi River and north of the Ohio River and of the southern boundaries of Pennsylvania and New Jersey consumed 79 per cent of the bituminous coal going into manufacturing. Between 1909 and 1929 the trend of manufacturing consumption in those states was approximately the same as that in the country as a whole.

In 1929, manufacturing plants in Pennsylvania consumed almost one-fourth of the coal going to all manufacturing plants in the United States. About three-fifths of the manufacturing consumption in Pennsylvania, however, was by the coke industry, whereas in 14 northeastern states and in the whole United States about two-fifths of the consumption was by that industry. The coke industry in Pennsylvania took less coal in 1929 than in either 1909, 1914, 1919, or 1923; in the 14 northeastern states and in the whole country, the 1929 consumption by the coke industry exceeded that of any of the other years.

In Pennsylvania, manufacturing industries other than the coke industry showed an increase in bituminous coal consumption from 1909 to 1914 and from 1914 to 1919, but they showed a small loss from 1919 to 1923 and a large loss from 1923 to 1929. In total manufacturing inclusive of the coke industry the changes

³⁰ *Fifteenth Census of the United States, Manufactures: 1929, Volume I, p. 112.*

are as follows: a decrease from 1909 to 1914, an increase from 1914 to 1919 and from 1919 to 1923, and a decrease from 1923 to 1929. The decline in the last-mentioned period more than offset the total net gain from 1909 to 1923; the manufacturing consumption in 1929 was 51,262,000 tons, or 5,591,000 tons less than the consumption in 1909. A large part of the decline in the consumption from 1923 to 1929 was attributable to the decline in coal consumed by the state's coke industry, but losses in other manufacturing industries also were responsible for an appreciable part of the recession. (The coke industry will be discussed more fully in a later section.)

Consumption by Mines and Quarries

Consumption of bituminous coal in 1929 by mines and quarries in Pennsylvania amounted to 1,308,000 tons, in 14 northeastern states to 4,575,000 tons, and in the United States to 8,934,000 tons (Table 45). About half the consumption by mines and quarries in the 14 northeastern states and in the whole country was for power and heat at bituminous coal mines, but in Pennsylvania four-fifths of it was for that purpose. Data for 1923 and for 1929 indicate that mines and quarries other than bituminous coal mines maintained their consumption of bituminous coal at approximately a uniform level, but the coal mines in the country consumed only one-third as much of their own coal in 1929 as in 1917. Increasing use of purchased electrical energy was a principal factor in the declining use of coal at coal mines. It is probable, however, that coal used directly by coal mines and that used indirectly decreased from 1917 to 1929. There is convincing evidence in the fact that consumption of bituminous coal at the mines in Pennsylvania decreased 2,404,000 tons from 1917 to 1929, whereas the consumption by electric public utilities in the state increased only 1,597,000 tons during the same years.

Consumption for Domestic Heat

Domestic (dwelling) use of bituminous coal in the United States amounted to 66,400,000 tons in 1923 and to 57,104,000 tons in 1917 (Table 45). Data on domestic consumption in individual states for 1917 (more recent data not available) show that one-half the domestic consumption was in 14 states in the

northeastern part of the country. These states had approximately one-half the population of the country in 1930. Although they are in the northern latitudes, their domestic consumption of bituminous coal was not greater than the average for the country, owing to the wide use of Pennsylvania anthracite in the northeastern states. Natural and manufactured gas may have been used more commonly for domestic heating in those states than in the country as a whole. It is probable, however, that fuel oil and wood were used to a lesser extent.

Domestic consumption of bituminous coal in Pennsylvania was comparatively small, according to the data for 1917. Consumption in that year was only 3.2 per cent of the total for the country. The population of the state, however, was roughly 8 per cent of the total. Undoubtedly, the prevailing use of anthracite for domestic heating in the eastern part of the state and the frequent use, even in the bituminous coal-producing areas, of natural gas from wells in the state and in West Virginia were responsible for the smallness of the domestic consumption.

Consumption by the Coke Industry

Among the major consumers of bituminous coal, the coke industry has had the greatest influence in altering the requirements for soft coal. The change from the beehive to the by-product process ranks high among the revolutionary changes in modern industry.

In considering the shift in the coke industry, one should remember that the industry reached an early development in Pennsylvania and that Pennsylvania predominated until the by-product method was introduced on a large scale. As late as 1915, Pennsylvania produced 61.6 per cent of the coke of the entire country, and 54.2 per cent of the output in the nation was beehive coke produced in western Pennsylvania.³¹ Coal for the beehive ovens came from the Pittsburgh seam of western Pennsylvania and northern West Virginia; this coal was then regarded as the best coal available for the purpose.³²

³¹ *Mineral Resources of the United States* (Part II), 1918, pp. 1451 and 1452.

³² Cf. Howard N. Evenson, *Southern High-Volatile Coal for Gas and Metallurgical Uses*, American Institute of Mining and Metallurgical Engineers, Inc., Technical Publication 489, p. 3.

The by-product method eliminated the necessity for using one grade of coal for coke making and permitted mixing of low-volatile and high-volatile coals.³³ Location of the by-product plants near the markets for coke and for by-product gas, at a considerable distance from the mines, enabled the coke producers to select their coals from various fields instead of relying principally on the Connellsville district.

Although the new regulatory devices in the by-product process permit the use of a wider variety of coals, a minimum of ash and sulphur remains highly desirable.³⁴ Much of the southern Appalachian (southern West Virginia, Kentucky, and Virginia) coal has a very low ash and sulphur content.³⁵ And although Pennsylvania has an advantage in distance to the by-product coke markets in the Chicago district, Michigan, northern Ohio, New York state, New England, and New Jersey, it no longer has the unapproachable position it enjoyed when the bulk of the coke industry was concentrated in the Connellsville district. Now, more than ever before, the Appalachian soft coal industry in its relation to the coke industry is affected by variations in transportation costs and in production costs among coal fields scattered far beyond the confines of a single state.

It is improbable that development in the processing of coals is at an end. Improvement in the distillation of low-grade coals will materially affect the market for high-grade coals. Experiments have been carried on, for example, in the low-temperature distillation of bituminous coal to produce a smokeless fuel that might compete with anthracite.³⁶ Thus far, these innovations have not been commercially profitable, except in so far as they have been introduced as a part of the by-product method; but they indicate possible shifts in the utilization of coal.

Although the by-product coke industry in the United States began production on a commercial basis in 1893, the major part of the transition from the beehive method to the

³³ *Ibid.*

³⁴ *Ibid.*

³⁵ M. R. Campbell and J. W. Bownocker, *The Coal Fields of the United States*, United States Geological Survey, Professional Paper 100, pp. 27-33.

³⁶ *Bituminous Coal Fields of Pennsylvania*, Part I, Pennsylvania Geological Survey, Fourth Series, Bulletin M6, 1928, p. 160.

by-product method came during and after the World War. Early development of the by-product industry in Pennsylvania lagged behind that in the country as a whole, but subsequently the development in Pennsylvania was relatively faster (Table 47). In 1916, Pennsylvania produced 27,159,000 tons of beehive coke and only 4,120,000 tons of by-product coke. By 1929, beehive output had fallen to 5,315,000 tons, whereas by-product output had gained to 14,489,000 tons. Total coke production in Pennsylvania was 57.4 per cent of national production in 1916 but only 33.1 per cent in 1929.

Less than one-fifth as much coal was consumed for beehive coke making in Pennsylvania in 1929 as in 1916 (Chart 22). In the United States as a whole the decline was somewhat greater. On the other hand, the by-product coke industry in Pennsylvania consumed about four times as much coal in 1929 as in 1916, and in the United States the industry used almost three times as much.

Chart 22
BITUMINOUS COAL CONSUMED ANNUALLY IN THE
MANUFACTURE OF COKE IN PENNSYLVANIA:
BEEHIVE, BY-PRODUCT, AND TOTAL,
1916-1934

(Data in Table 47)

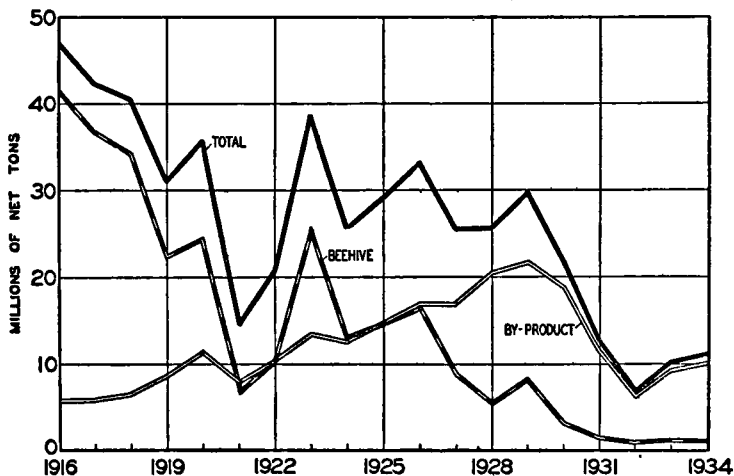


Table 47
BITUMINOUS COAL USED IN THE MANUFACTURE OF COKE AND AMOUNT OF COKE PRODUCED
PENNSYLVANIA AND THE UNITED STATES, 1916-1934
(Thousands of Net Tons)

Year	Coal Consumed in the Manufacture of Coke						Coke Production Excluding Coke Breeze					
	Pennsylvania			United States			Pennsylvania			United States		
	By-Prod.	Beehive	Total	By-Prod.	Beehive	Total	By-Prod.	Beehive	Total	By-Prod.	Beehive	Total
1916	5,650	41,300	46,950	26,525	55,085	81,609	4,120	27,159	31,280	19,069	35,464	54,534
1917	5,716	36,595	42,311	31,506	52,247	83,752	4,096	23,816	27,912	22,439	33,168	55,607
1918	6,515	34,059	40,574	36,868	48,160	85,028	4,587	22,137	26,724	25,998	30,481	56,478
1919	8,592	22,365	30,957	35,857	29,730	65,588	5,867	14,635	20,502	25,138	19,043	44,181
1920	11,326	24,344	35,670	44,205	31,986	76,191	7,730	15,908	23,639	30,834	20,511	51,345
1921	7,865	6,722	14,588	28,713	8,475	37,189	5,303	4,466	9,769	19,750	5,538	25,288
1922	10,364	10,417	20,781	41,053	13,286	54,339	7,152	6,840	13,992	28,551	8,573	37,124
1923	13,408	25,177	38,585	54,276	30,084	84,360	9,186	16,439	25,624	37,598	19,380	56,978
1924	12,556	12,990	25,545	49,061	15,914	64,976	8,426	8,501	16,927	33,984	10,286	44,270
1925	14,680	14,572	29,252	57,110	17,423	74,532	9,853	9,574	19,428	39,912	11,355	51,267
1926	16,895	16,344	33,240	63,647	19,224	82,871	11,201	10,722	21,923	44,377	12,489	56,866
1927	16,691	8,730	25,421	63,240	11,208	74,448	11,061	5,716	16,777	43,885	7,207	51,092
1928	20,326	5,266	25,592	70,166	7,018	77,184	13,475	3,442	16,917	48,313	4,493	52,806
1929	21,644	8,111 ^a	29,755 ^a	76,759	10,028	86,786	14,489	5,315 ^b	19,804 ^b	53,412	6,472	59,884
1930	18,776	3,019	21,795	65,521	4,284	69,805	12,529	2,011	14,541	45,196	2,776	47,972
1931	11,250	1,310	12,560	46,846	1,767	48,613	7,525	856	8,380	32,356	1,128	33,484
1932	6,115	778	6,893	30,887	1,030	31,917	4,038	506	4,544	21,137	652	21,789
1933	9,181	1,052	10,233	38,681	1,461 ^c	40,142 ^c	6,170	670	6,840	26,678	911 ^c	27,589 ^c
1934	10,083	1,124	11,208	44,343	1,635	45,978	6,834	721	7,555	30,793	1,029	31,822

Source: Various issues of *Mineral Resources of the United States* (Part II). *Monthly Cokes Report* Number M.C.R. 82. *Coke and By-Products Tables, 1934* (mimeographed, issued by the United States Bureau of Mines). Totals are based on exact figures, not on rounded numbers.

^a Excludes estimated consumption of 84,342 tons in Ohio which was included with the data for Pennsylvania. The tonnage for Ohio was estimated (by the authors) on the basis of the number of ovens.

^b Excludes estimated production of 53,000 tons in Ohio which was included with the data for Pennsylvania. The tonnage for Ohio was estimated (by the authors) on the basis of the number of ovens.

^c Revised data.

The by-product method reduced the amount of coal necessary to produce a ton of coke. In 1929, the yield of coke from the beehive process in the United States was 64.5 per cent, but the yield from the by-product process was 69.6 per cent. The introduction of by-product ovens in the United States was largely responsible for raising the proportion of total coke recovered from coal from 66.8 per cent in 1916 to 69.0 per cent in 1929. In addition, the by-product method conserved the valuable liquids and gases given off during the coking process. When by-products were not recovered, it was most economical to coke the coal at the mines and to transport the coke to the point of consumption; but, with a larger recovery of coke and with conservation of by-products, it became profitable to ship coal to the place of consumption. Consequently, part of the coke industry changed location from Pennsylvania to other states.

Before the introduction of by-product plants throughout the country, Pennsylvania shipped large quantities of coke to other states. Some of the coke went as far as Montana and California.³⁷ In 1916, Ohio obtained 7,246,000 tons of Pennsylvania coke, New York obtained 2,413,000 tons, and Illinois-Indiana obtained 788,000 tons (Table 48). In 1929 the shipments fell to 1,734,000 tons for Ohio, to 1,017,000 tons for New York, and to 20,000 tons from Illinois-Indiana. The heavy loss of Pennsylvania coke producers in markets in other states is shown clearly in Chart 23.

Producers of coke outside Pennsylvania, however, did not make appreciable inroads on the Pennsylvania markets for coke (Table 49). Of the 19,377,000 tons of coke used in the state in 1916, only 362,000 tons were produced outside the state; and, of the 16,707,000 tons consumed in 1929, only 229,000 tons came from out-of-state ovens. There was a shift within the state, however. When coke was produced in beehive ovens, all the production of the state was in western or central Pennsylvania. Now, a considerable tonnage of by-product coke is produced in the eastern part of the state.

Blast furnaces consume a major portion of the coke produced, although other uses are increasing rapidly in impor-

³⁷ *Mineral Resources of the United States (Part II)*, 1917, p. 1187.

Table 48
DISTRIBUTION OF COKE PRODUCED IN PENNSYLVANIA TO SPECIFIED STATES
AND TOTAL COKE CONSUMPTION IN THOSE STATES, 1916 AND 1929
(Thousands of Net Tons)

Year, Use, and Type of Coke	Destination of Coke Produced in Pennsylvania						Total Consumption, Exclusive of Imports ^a					
	Penn- sylvania	New York	Ohio	Illinois- Indiana	Other States	All States	Penn- sylvania	New York	Ohio	Illinois- Indiana	Other States	All States
1916												
Large Coke												
Furnace Use.....	18,470	2,203	7,056	758	584	29,071	18,679	2,912	9,767	6,227	10,290	47,875
Foundry Use.....	368	181	144	24	214	931	392	276	270	414	1,327	2,680
Domestic and All Other Uses.....	178	29	45	7	87	346	306	160	119	513	1,518	2,616
Total Large Coke.....	19,015	2,443	7,246	788	886	30,348 ^b	19,377	3,349	10,156	7,155	13,135	53,172
1929												
Large Coke												
Furnace Use.....	15,491	854	1,685	7	155 ^c	18,192 ^c	15,611	2,925	9,664	8,317	8,478 ^d	44,995 ^d
Foundry Use.....	491	48	29	5	117 ^c	600 ^c	452	192	297	424	1,408 ^d	2,774 ^d
Domestic and All Other Uses.....	586	115 ^e	20	8	177 ^c	906 ^c	644	2,397	655	1,787	5,420 ^d	10,902 ^d
Total Large Coke.....	16,478	1,017 ^f	1,734	20	449 ^c	19,698 ^c	16,707	5,514	10,616	10,528	15,306	58,671
By-Product, Total.....	13,597	25 ^c	778	0	75 ^c	14,475 ^c	13,825	4,522	9,409	10,494	14,386	52,635
Beehive, Total.....	2,881	992	956	20	374 ^c	5,223 ^c	2,882	992	1,207	34	920	6,035
Coke Breeze.....	1,547	29	49	1 ^c	13 ^c	1,639 ^c	1,555	398	749	855	1,182	4,738
Total Coke, All Types.....	18,025	1,046	1,783	21 ^c	462 ^c	21,337 ^c	18,262	5,912	11,365	11,383	16,488	63,409

Source: *Mineral Resources of the United States* (Part II), 1917, pp. 1187, and 1192. *Supplement to Monthly Coal Distribution Report*, Number 2 (mimeographed, issued by the United States Bureau of Mines).

^a Imports amounted to 54,955 tons in 1916 and to 119,724 tons in 1929. See *Mineral Resources of the United States* (Part II), 1929, p. 635.

^b Pennsylvania also exported 777,672 tons not included here.

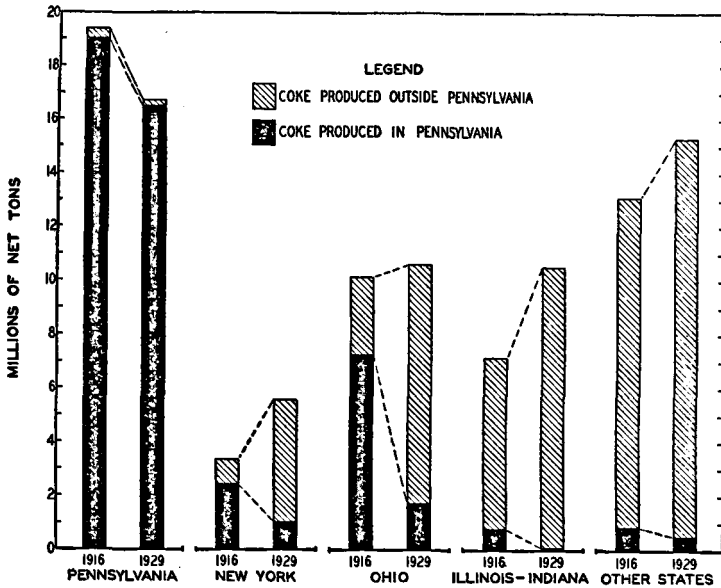
^c Estimated.

^d A very small tonnage for domestic and all other use is included under "furnace use" and a very small tonnage for foundry use is included under "domestic and all other uses."

^e Partly estimated. The exact figure cannot be less than 89,783 tons nor more than 139,050 tons.

^f Partly estimated. The exact figure cannot be less than 992,036 tons nor more than 1,041,303 tons.

Chart 23
CONSUMPTION OF COKE IN SPECIFIED STATES, AND
PORTION PRODUCED IN PENNSYLVANIA,
1916 AND 1929
 (Large Coke Only. Based on Data in Table 48)



tance. Furnace consumption of coke in the United States was 90.0 per cent of total coke consumption in 1916 and 76.7 per cent in 1929 (Table 48). The proportions were considerably higher in Pennsylvania, being 96.4 per cent in 1916 and 93.4 per cent in 1929. The amount of coke taken by the furnaces in those years declined from 47,875,000 tons to 44,995,000 tons for the United States and from 18,679,000 tons to 15,611,000 tons for Pennsylvania. In sharp contrast with these declines, coke consumption by foundries in the United States increased from 2,680,000 tons in 1916 to 2,774,000 tons in 1929; "domestic and all other" consumption increased from 2,616,000 tons to 10,902,000 tons. Pennsylvania foundries increased their consumption of coke from 392,000 tons in 1916 to 452,000 tons in 1929, whereas "domestic and all other" consumption gained from 306,000 tons to 644,000 tons during the same years.

Table 49
COKE CONSUMPTION IN PENNSYLVANIA
ACCORDING TO ORIGIN, 1916 AND 1929
 (Thousands of Net Tons)

Use and Type of Coke	1916			1929		
	Produced in Pennsylvania	Produced Outside Pennsylvania	Total Consumption	Produced in Pennsylvania	Produced Outside Pennsylvania	Total Consumption
Furnace Use						
By-product.....	"	"	"	13,186	120	13,306
Beehive.....	"	"	"	2,305	0	2,305
Total.....	18,470	209	18,679	15,491	120	15,611
Foundry Use						
By-product.....	"	"	"	35	50	85
Beehive.....	"	"	"	366	1	367
Total.....	368	25	392	400	52	452
Domestic and All Other Uses						
By-product.....	"	"	"	375	58	434
Beehive.....	"	"	"	211	0	211
Total.....	178	128	306	586 ^b	58 ^b	644 ^b
Total Large Coke						
By-product.....	"	"	"	13,597	228	13,825
Beehive.....	"	"	"	2,881	1	2,882
Total.....	19,015	362	19,377	16,478	229	16,707
Coke Breeze.....	"	"	"	1,547	8	1,555
Grand Total, All Types	"	"	"	18,024	237	18,262

Source: *Mineral Resources of the United States* (Part II), 1917, p. 1196. *Supplement to Monthly Coal Distribution Report*, Number 2 (mimeographed, issued by the United States Bureau of Mines). Totals are based on exact figures, not on rounded numbers.

^a No data. By-product and beehive coke consumption were not reported separately in 1916. Pennsylvania produced 27,159,438 tons of beehive coke and 4,120,257 tons of by-product coke in that year.

^b In 1929, there were 202,530 tons of Pennsylvania coke and 47,139 tons from other states used for domestic heating.

Undoubtedly, the change from the beehive to the by-product method of coke production has been important in facilitating the development of the iron and steel industry outside the state. This development outside the state has led not only to a loss in the use of Pennsylvania coal for making furnace coke but also to a loss in the use of Pennsylvania coal for gas making, heating, and steam raising in the iron and steel industry.

The amount of coke consumed in the production of a ton of pig iron has steadily decreased. In 1916, 1.02 net tons of coke were used in the production of a net ton of pig iron, and in 1929 only 0.92 of a ton was used.³⁸ This economy in the use

³⁸ *Coal in 1929*, p. 778.

of fuel changed the cost ratios in the iron and steel industry so that development away from the source of the fuel was encouraged. One shift in the coke industry and in the iron and steel industry led to another shift; in the main, the shifts were unfavorable to the Pennsylvania coal mines.

Not all the coke industry moving out of Pennsylvania to other states, however, has been lost as a market for Pennsylvania coal (Chart 24). In part, the coal industry of the state has reached out to the markets developed in neighboring states, though it has by no means avoided loss of a considerable share of the business. Pennsylvania coal used in the manufacture of by-product coke in Massachusetts, New York, Ohio, Maryland, West Virginia, Illinois-Indiana, and probably in a few other states increased between 1916 and 1929 (Table 50). Shipments to Ohio by-product ovens increased from 1,283,000 tons in 1916 to 6,615,000 tons in 1929; to New York ovens (mostly at Buffalo), from 1,000,000 tons in 1916 to 3,739,000 tons in 1929; and to West Virginia ovens, from none

Chart 24

PENNSYLVANIA BITUMINOUS COAL USED IN THE MANUFACTURE OF COKE: BEEHIVE AND BY-PRODUCT, SELECTED YEARS

(Data in Table 50)

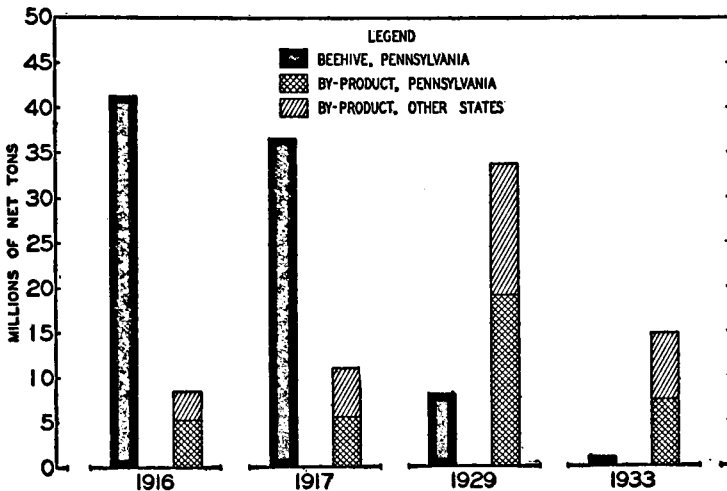


Table 50
BITUMINOUS COAL USED IN THE MANUFACTURE OF COKE IN SPECIFIED STATES
ACCORDING TO ORIGIN, 1916, 1917, 1929, AND 1933
(Thousands of Net Tons)

Year and Origin of Coal	Coal Used for the Manufacture of By-Product Coke in the State Specified											Coal Used for Beehive Coke Manufacture ^h	Total Coal Used for Coke Manufacture
	Pennsylvania	Massachusetts	New York	New Jersey	Ohio	Maryland	West Virginia	Michigan	Illinois-Indiana	Other States	Total		
1916													
Pennsylvania.....	5,286	0	1,000	b	1,283	187	0	b	343	365	8,465	41,300	49,765
West Virginia.....	364	488	98	b	694	562	276	b	5,464	3,313	11,261	3,796	15,057
Other States and Imported..	0	240 ^c	0	b	471	0	0	b	2,002	4,086	6,799 ^e	9,949	16,788 ^e
Total.....	5,650	728	1,098	b	2,448	750	276	b	7,809	7,765	26,525	55,085	81,609
1917													
Pennsylvania.....	5,564	0	1,283	279	2,107	183	553	b	432	619	11,019	36,595	47,614
West Virginia.....	153	455	118	343	1,273	550	175	b	4,879	2,871	10,817	4,754	15,571
Other States and Imported..	0	284 ^d	0	0	1,762	0	0	b	2,741	4,884	9,670 ^d	10,898	20,568 ^d
Total.....	5,716	739	1,401	622	5,141	733	728	b	8,052	8,374	31,506	52,247	83,752
1929													
Pennsylvania.....	19,149	325	3,739	2	6,615	728	1,443	e	659 ^f	312	33,744	8,111 ^g	41,855 ^g
West Virginia.....	2,495	497	1,516	620	3,630	1,186	613	1,633	8,620	2,538	23,348	839	24,187
Other States.....	0	311	894	602	2,070	0	0	e	5,443 ^f	9,299	19,973	1,067 ^f	21,040 ^f
Total.....	21,643	1,133	6,150	1,223	12,314	1,914	2,056	3,760	14,722	12,148	77,065	10,018 ^f	87,082
1933													
Pennsylvania.....	7,449	0	2,540	23	2,156	304	1,133	701	310	220	14,838	1,052	15,890
West Virginia.....	1,738	1,443	1,732	962	2,735	668	451	930 ^k	3,240	2,161 ^k	16,597	134	16,731
Other States.....	69	40	690	245	316 ^k	0	0	1,544	1,658 ^k	3,395	8,021	222	8,242
Total.....	9,257	1,483	4,962	1,230	5,207 ^k	972	1,584	3,175 ^k	5,208 ^k	5,777 ^k	39,455	1,408	40,863

Source: *Mineral Resources of the United States* (Part II), 1917, pp. 1144-1145 and 1178-1179; and 1929, pp. 577 and 604. *Minerals Yearbook*, 1934, pp. 592 and 605-607. Totals are based on exact figures, not on rounded numbers.

- a Produced in the vicinity of the mines supplying the coal.
- b Included in "other states."
- c 240,000 tons of coking coal was imported, all of which was used in Massachusetts.
- d 154,610 tons of coking coal was imported, all of which was used in Massachusetts.
- e 2,127,481 tons from Pennsylvania and Kentucky combined.
- f Indiana only. Figure for Illinois is not available. Pennsylvania supplied 503,591 tons of the coal to Illinois in 1930.
- g Excludes estimated consumption of 84,342 tons for Ohio which was included with the data for Pennsylvania. The tonnage for Ohio was estimated (by the authors) on the basis of the number of ovens.
- h Includes the extension of the Pocahontas field into Tazewell County, Virginia.
- i Includes Pennsylvania coal supplied to Illinois.
- j Includes estimated beehive production for Ohio.
- k Excludes items included under "undistributed." There were 601,130 tons of coal recorded as "undistributed," of which 536,928 tons were from West Virginia and 64,202 tons from Kentucky.

Table 51
BITUMINOUS COAL DELIVERED TO CLASS I RAILROADS IN
THE UNITED STATES FOR RAILROAD FUEL, ACCORDING
TO ORIGIN, 1917, 1928, AND 1929
 (Amounts in Thousands of Net Tons)

Origin	1917	1928	1929	Ratio of 1929 Tonnage to 1917 Tonnage
Central Pennsylvania.....	18,164	9,509	9,462	52.1%
Western Pennsylvania.....	14,482	16,363	17,707	122.3
Somerset-Meyersdale.....	2,576	876	902	35.0
Total Pennsylvania.....	35,221	26,748	28,072	79.7
Cumberland-Piedmont.....	524	413	647	123.3
Northeastern Ohio and Panhandle, West Virginia.....	8,478	6,961	8,914	105.1
Southern Ohio.....	4,432	895	1,676	37.8
Northern West Virginia.....	5,840	10,680	11,150	190.9
Southern West Virginia.....	8,546	12,255	11,333	132.6
Virginia.....	2,910	2,920	3,086	106.0
Eastern Kentucky.....	1,792	3,340	3,450	192.5
Western Kentucky.....	2,798	4,197	4,203	150.2
Michigan.....	345	398	482	139.6
Indiana.....	7,038	5,487	6,111	86.8
Illinois.....	33,697	18,761	19,911	59.1
Alabama, Tennessee, and North Carolina Mississippi to Mountains.....	7,690	7,559	7,514	97.7
Mississippi to Mountains.....	13,305	5,191	5,476	41.2
Mountain and Pacific States.....	15,195	11,747	11,765	77.4
Canada.....	585	255	268	45.8
Confiscated and Origin Unknown.....	1,686	263	102	6.0
Grand Total.....	150,084	118,070	124,160	82.7

Source: *Monthly Coal Distribution Report*, Number 8, March 21, 1932 (mimeographed, issued by the United States Bureau of Mines). Totals are based on exact figures, not on rounded numbers.

^a Consists of the Pittsburgh, Westmoreland, Connellsville, Freeport, and northwestern Pennsylvania fields.

^b Consists of the Kanawha, Logan, Kenova-Thacker, New River, and Poca-hontas fields.

^c Consists of northeastern Kentucky, McRoberts, Hazard, and south-eastern Kentucky fields.

^d Includes West North Central States and West South Central States.

in 1916 to 1,443,000 tons in 1929. For many states, shipments of Pennsylvania bituminous coal for coke making either accounted for most of the increase in total coal shipments to the states or prevented the total coal shipments from showing a greater loss than they would otherwise have shown.⁸⁹

Mine operators in West Virginia and in other states, however, also increased their sales of coal to by-product coke producers outside Pennsylvania and so cut into the market available to Pennsylvania operators. Even though Pennsylvania coal used by the by-product industry in the United States in-

⁸⁹ Compare Table 5 with Table 50.

creased from 8,465,000 tons in 1916 to 33,744,000 tons in 1929, losses in consumption by the beehive coke industry were so large that the total amount of Pennsylvania coal used for beehive and by-product coke fell from 49,765,000 tons in 1916 to 41,855,000 tons in 1929. Pennsylvania mines supplied 61.0 per cent of the coal for the nation's coke industry in 1916, and only 48.1 per cent in 1929.

Consumption by Railroads

In 1929 approximately one ton out of every four tons of bituminous coal produced in the United States was consumed by railroads. Total consumption by railroads, including coal used for stations, shops, etc., as well as for locomotive fuel, was 131,100,000 tons in that year.⁴⁰ Class I railroads, that is, railroads having gross operating revenues of \$1,000,000 or more each per year, took 124,160,000 tons (Table 51).

Notwithstanding the enormous size of the railroad consumption in 1929, the railroads used less bituminous coal in that year than in many previous years. Deliveries to Class I railroads in 1917 were 150,084,000 tons, or 25,924,000 tons more than in 1929. Economy in the use of coal was mainly responsible for the decrease. Increased use of fuel oil and of electrical energy also contributed to the curtailment in the railroad use of coal.

Pennsylvania supplied more railroad fuel in 1917, 1928, and 1929 than any other state (Table 51). In 1929, 28,072,000 tons, or 22.6 per cent of the soft coal supplied to the railroads, originated in Pennsylvania. There was little change between 1917 and 1929 in the proportion of total railroad fuel supplied by Pennsylvania producers, but there was a distinct shift from the low- and medium-volatile coals of central Pennsylvania to the high-volatile coals of western Pennsylvania. From 1917 to 1929, deliveries to Class I railroads from the central Pennsylvania district decreased 47.9 per cent, and those from the Somerset-Meyersdale district decreased 65.0 per cent; but such deliveries from the western Pennsylvania district increased 22.3 per cent. Railroad fuel from the state as a whole decreased 20.3 per cent.

⁴⁰ *Statistical Supplement to Minerals Yearbook, 1934, p. 310.*

Coal mines in southern Ohio, Illinois, and states west of the Mississippi River suffered large losses in the railroad fuel market from 1917 to 1929. On the other hand, West Virginia and Kentucky practically doubled their percentage share of the railroad market during the same years.

Railroads consume large quantities of fuel in transporting coal for their own use and for other uses. In part, therefore, the decrease in railroad consumption of Pennsylvania coal relates to the decrease in total coal and coke transported from the mines in the state; conversely, a part of the increase in railroad consumption of coal produced in West Virginia and Kentucky is attributable to the increased haulage of coal mined in those states.

Most of the railroad fuel coal is carried by all-rail routes, but some is shipped by way of the Great Lakes, and some, also, by way of Atlantic tidewater.

In 1929, the Pennsylvania mines supplied 1,438,000 tons of the total 4,565,000 tons shipped to Class I railroads by lake routes (Table 52). Deliveries of railroad fuel to Class I roads by way of Atlantic tidewater in that year were reported as 1,630,000 tons, all from West Virginia. Tidewater deliveries of coal for railroads from Pennsylvania mines were not important in 1916, although they attained considerable importance during our participation in the World War. Tidewater shipments of fuel coal were taken by railroads in New England; lake shipments, by railroads in the upper lakes territory.⁴¹

Consumption by Vessels

The Appalachian coal fields supply large tonnages of bituminous coal for fuel in domestic and foreign vessels. Great Lakes vessels consume a considerable amount of the coal, but a much larger tonnage is used by vessels loading the coal at Atlantic ports.

Most of the coal consumed by vessels on the Great Lakes is loaded into the bunkers at Lake Erie ports along the southern shore from Toledo, Ohio, to Erie, Pennsylvania. A small

⁴¹ *Supplement to Monthly Coal Distribution Report Number 3* (mimeographed, issued by the United States Bureau of Mines); and *Mineral Resources of the United States* (Part II), 1918, p. 1320.

**BITUMINOUS COAL DELIVERED TO RAILROADS IN THE UNITED STATES FOR RAILROAD FUEL,
BY ORIGIN AND BY DELIVERY ROUTE, 1916, 1917, 1918, AND 1929^a**

(Thousands of Net Tons)

Origin (Specified Areas and the United States)	1916				1917				1918 Total ^b	1929			
	By All-Rail	By Lake	By Tide-water	Total	By All-Rail	By Lake	By Tide-water	Total		By All-Rail to All Roads ^c	By Lake to Class I Roads ^c	By Tide-water to Class I Roads ^c	Total ^d
Central Pennsylvania.....	"	"	"	"	18,024	196	264	18,483	18,545	12,276	0	0	12,276
Western Pennsylvania (ex- cluding Panhandle).....	"	"	"	"	12,573	1,863	669	15,232 ^f	18,521 ^g	14,640	1,438 ^h	0	16,078
Somerset-Meyersdale.....	"	"	"	"	2,572	0	44	2,616	606	894	0	0	894
Total, Pennsylvania.....	30,047	3,547	101	33,694	33,168	2,059	977	36,331 ^f	37,672 ^g	27,810	1,438 ^h	0	29,248
Cumberland-Piedmont.....	"	"	"	"	469	0	102	571	483	759	0	0	759
Fairmont and Panhandle, West Virginia.....	"	"	"	"	4,416	672	916	6,005 ^f	8,854	12,366	1,558 ^h	189	14,113
Southern West Virginia.....	"	"	"	"	7,749	180	905	8,834 ^f	8,847	10,158	55	1,441	11,654
Total, West Virginia.....	15,786	744	587	17,116	12,165	852	1,820	14,838 ^f	17,702	22,524	1,613	1,630	25,767
Ohio.....	10,449	633	0	11,082	11,574	1,653	0	13,227	12,485	7,098	1,514	0	8,612
Kentucky.....	4,188	0	0	4,188	4,761	1	0	4,842 ^f	6,673	6,151	0	0	6,151
Virginia.....	2,147	0	600	2,747	2,657	0	421	3,078	3,065	2,936	0	0	2,936
Illinois-Indiana.....	29,348	0	0	29,348	42,929	0	0	42,929	41,275	26,728	0	0	26,728
United States ^j	129,780	4,923	1,288	136,000	145,865	4,568	3,635	156,147 ^k	160,639 ^l	120,002	4,565	1,630	126,567 ^m

Source: *Mineral Resources of the United States* (Part II), 1916, pp. 924-926; 1917, pp. 1251-1252; and 1918, pp. 1363-1364. *Supplement to Monthly Coal Distribution Report*, Numbers 1, 3, 4, and 6 (mimeographed, issued by the United States Bureau of Mines). Totals are based on exact figures, not on rounded numbers.

^a The data for 1916 represent consumption as reported by the railroads; those for 1917, 1918, and 1929 represent deliveries to railroads and differ from consumption if stocks differ at the beginning and end of the year.

^b The distribution during 1918 was greatly affected by the wartime control of fuel. For detailed information see *Mineral Resources*, (Part II), 1918, pp. 1363-1364.

^c Data on deliveries by all-rail were reported by traffic managers and those for lake and tidewater deliveries, by purchasing agents. There was a small difference in the reported origins because of a difference in the definition of the areas.

^d Consists of all-rail deliveries to all railroads and of lake and tidewater deliveries to Class I railroads. The Class I railroads consumed about 96 per cent of the railroad fuel in the United States.

^e No data.

^f Includes coal delivered by river. This coal amounted to 126,626 tons for Pennsylvania; to 1,619 tons for Fairmont, West Virginia; to 134 tons for southern West Virginia; and to 79,072 tons for Kentucky.

^g Includes 139,976 tons of coal delivered by river.

^h 85,000 tons delivered to railroads in the northwestern region from the Panhandle of West Virginia have been subtracted from the lake tonnage for western Pennsylvania (including the Panhandle) and added to the lake tonnage for Fairmont and Panhandle, West Virginia.

ⁱ The northern part of Tazewell County, Virginia, is included in southern West Virginia except in 1916.

^j Includes imported coal amounting in the aggregate to 424,802 tons in 1916, to 586,218 tons in 1917, to 647,880 tons in 1918, and to 267,863 tons in 1929.

^k Includes 207,451 tons delivered by river and 1,866,101 tons of confiscated coal of unknown origin.

^l Includes 139,976 tons delivered by river and 1,737,791 tons of confiscated coal of unknown origin.

^m Includes 267,863 tons of Canadian coal and 101,838 tons of coal of unknown origin consumed by Class I railroads. These amounts are not distributed among all-rail, lake, and tidewater.

Table 53
BITUMINOUS COAL SUPPLIED TO VESSELS AT LOWER LAKE
PORTS AND AT ATLANTIC PORTS FOR VESSEL FUEL,
BY ORIGIN, 1915, 1917, 1918, AND 1929
 (Thousands of Net Tons)

Origin	Lake Fuel Coal			Atlantic Tidewater Fuel Coal (Domestic and Foreign Vessels) ^a			
	1915	1918	1929	1915	1917 ^b	1918 ^b	1929
Central Pennsylvania.....	c	d	5	c	3,302	4,279	c
Western Pennsylvania.....	c	890	537	c	264	148	c
Somerset-Meyersdale.....	c	0	d	c	1,200	1,824 ^e	c
Total Pennsylvania.....	1,009	890	542	5,889	4,766	c	c
Ohio.....	217	571	535	0	3	d	c
Maryland.....	0	0	0	76	900 ^f	e	c
Northern West Virginia.....	h	14	95	h	345	191	c
Total Northern Fields.....	1,226	1,475	1,172	5,965	6,014	6,442	3,219
Southern West Virginia.....	223 ^j	122	219	2,801 ^k	3,169	4,709	c
Eastern Kentucky.....	12	19	61	0	28	8	c
Virginia.....	0	0	0	h	119 ^l	81 ^l	c
Total Southern Fields.....	235	141	280	2,801	3,316	4,798	2,288
Grand Total.....	1,462	1,616	1,452	8,766	9,330	11,240 ^m	5,507

Source: *Mineral Resources of the United States* (Part II), 1915, p. 471; 1917, p. 1253; 1918, pp. 1320 and 1327. *Weekly Coal Report*, Number W.C.R. 653 (mimeographed, issued by the United States Bureau of Mines). Report of the Ore and Coal Exchange (for 1929 data on lake fuel coal).

^a Loaded at ports from New York to Charleston. Does not include fuel coal loaded at New England ports. This coal (excluding imported coal) amounted to 276,854 tons in 1917 and to 292,939 tons in 1918. Most of it came from West Virginia and Virginia.

^b For data on vessel fuel coal loaded at each port, by field of origin, 1917 and 1918, see *Mineral Resources of the United States* (Part II), 1917 and 1918.

^c No data.

^d Less than 500 tons.

^e Cumberland-Piedmont is combined with Somerset-Meyersdale.

^f Cumberland-Piedmont district.

^g Fairmont field and Moundsville field.

^h Included in southern West Virginia.

ⁱ Pocahontas, Tug River, Kenova-Thacker, Radford, New River, and Kanawha districts.

^j Includes the Fairmont and Moundsville districts.

^k Includes the Virginia district and the Fairmont and Moundsville districts.

^l Includes the Clinch Valley and southwestern Virginia districts.

^m Includes a considerable amount of coal for the Army and Navy transport bunkers.

tonnage (395,609 tons in 1929), however, is taken at upper lake docks.⁴³

Bituminous fuel coal supplied to vessels at lower lake ports amounted to slightly less than 1,500,000 tons both in 1929 and in 1915 (Table 53). The trend of fuel consumption by the lake vessels has been slightly downward during the past 20 years (Table 54). This decline has taken place in spite of

⁴³ Supplement to *Monthly Coal Distribution Report* Number 3.

the fact that cargo shipments of coal on the lakes have shown a steeply upward trend (Table 25).

In 1915 Pennsylvania supplied 1,009,000 tons, or 69.0 per cent, of the total vessel fuel taken at the lower lake ports; the proportion fell to 55.1 per cent in 1918 and to only 37.3 per cent in 1929 (Table 53). The tonnage supplied by Pennsylvania in 1929 was only about half as much as that in 1915.

Table 54
BITUMINOUS COAL LOADED INTO VESSELS FOR VESSEL FUEL
1915-1934
(Thousands of Net Tons)

Year	Lake Erie Ports	Atlantic Tidewater Ports (Domestic and Foreign Trade Vessels)						Total Foreign Trade Vessels ^e
		Total	New York	Phila- delphia	Balti- more	Hampton Roads	Charles- ton	
1915	1,462	8,287	4,110 ^b	929	886	2,352	9 ^c	8,368
1916	1,681	^d	^d	^d	^d	^d	^d	8,765
1917	1,642	8,774	4,384	510	666	3,103	112	7,709
1918	1,562 ^e	11,240	4,747 ^e	859 ^e	836 ^e	4,724 ^e	74	6,189
1919	1,037	6,874	2,659	677	610	2,837	90	8,224
1920	1,259	9,171	3,965	662	888	3,550	106	10,486
1921	759	8,135	3,882	480	509	3,238	26	8,453
1922	829	4,576	2,158	273	198	1,895	53	4,615
1923	1,629	5,442	2,705	458	420	1,819	40	5,093
1924	1,348	4,961	2,097	367	278	2,183	37	4,460
1925	1,532	5,488	2,299	428	302	2,407	52	4,866
1926	1,585	8,545	2,880	729	967	3,836	133	7,736
1927	1,451	5,709	2,778	360	237	2,246	88	4,565
1928	1,364	5,534	2,840	236	213	2,153	91	4,294
1929	1,451	5,507	2,686	272	262	2,216	72	4,287
1930	1,320	5,092	2,615	220	286	1,903	68	3,497
1931	972	3,510	1,906	127	180	1,269	27	2,195
1932	610	1,574	538	102	77	838	20	1,350
1933	982	1,571	449	121	83	901	17	1,316
1934	1,102	1,545	424	123	112	863	23	1,320

Source: *The Coal Trade*, 1920, pp. 89, 99, 203, and 204. *Seward's Annual*, 1921-1924, *Mineral Resources of the United States* (Part II), 1915, pp. 475-476; 1917, pp. 1211, 1212, 1252; 1918, pp. 1322-1323; 1926, pp. 514-515; 1927, p. 442; 1928, pp. 520 and 524; 1930, p. 676. *Statistical Appendix to Minerals Yearbook*, 1934, p. 311. Various issues (especially January issues) of *Monthly Coal Distribution Report*; and *Weekly Coal Report*, Numbers 653 and 708 (mimeographed, issued by the United States Bureau of Mines). *Survey of Current Business*, March, 1935, p. 43. The data on fuel supplied at lake ports are collected by the Ore and Coal Exchange; those on fuel supplied at Atlantic ports, by the Bureau of Mines; and those on fuel supplied to all foreign trade vessels, by the Bureau of Foreign and Domestic Commerce. Totals are based on exact figures, not on rounded numbers.

^a Includes loadings at all United States ports, but the bulk was loaded at Atlantic and Great Lakes ports. See *Mineral Resources* (Part II), 1918, p. 1365.

^b Does not include 280,000 tons (estimated by the Bureau of Mines) supplied at New York harbor directly from coastwise barges to steamships.

^c Supplied to foreign trade vessels. There may have been a small tonnage supplied to domestic vessels, although none was supplied to them in 1914.

^d No data.

^e Includes a considerable amount for Army and Navy transport bunkers (counted as domestic vessel fuel).

West Virginia and Ohio mines, on the contrary, supplied considerably more of the coal in 1929 than in 1915.

Bituminous fuel coal supplied to vessels at Atlantic ports decreased from 8,766,000 tons in 1915 and 9,330,000 tons in 1917 to 5,507,000 tons in 1929. A major portion of the coal was loaded at New York and Hampton Roads harbors, but Philadelphia and Baltimore harbors handled significant tonnages. Small amounts of the coal for vessel fuel were loaded also at Charleston harbor and New England ports. Data published for 1917 indicate that Pennsylvania supplied most of the vessel fuel coal loaded at New York, Philadelphia, and Baltimore, whereas southern West Virginia, eastern Kentucky, and Virginia supplied all that loaded at Hampton Roads and Charleston. Loadings at each of the ports showed a declining trend from 1915 through 1929. Loadings at the three northern ports fell from 5,925,000 tons in 1915 to 3,220,000 tons in 1929, and those from the two southern ports fell from 2,361,000 tons in 1915 to 2,288,000 tons in 1929.

Probably three factors accounted for the recession in the Atlantic vessel fuel market. Foreign mines offered increasing competition to the American mines.⁴³ Oil burning vessels undoubtedly were used much more commonly in the later years than in earlier years. Steamship concerns, following the example of the railroads, probably decreased their consumption of coal per ton-mile of traffic. In view of the expansion of foreign trade during the 1920's, decreased consumption by vessels was not due to decreased volume of traffic. Consumption from the American mines decreased in spite of heavier vessel traffic.

Consumption by Electric Power Plants

The electric power industry has been of growing importance as a market for bituminous coal (Tables 45 and 46). Consumption of soft coal by electric power plants has increased in spite of the fact that the amount of coal used per unit of electrical energy generated has steadily decreased. In 1919, 3.2 pounds of fuel were used per kilowatt hour of output, but in 1929 only 1.68 pounds were used for the same unit of output.⁴⁴

⁴³ *Coal in 1929*, pp. 792-793.

⁴⁴ *Coal in 1929*, p. 777.

A study of coal consumed by electric public utility power plants in the United States in 1928 was made by William Harvey Young, the study being a joint project of the Institute of Economics and the United States Geological Survey. The data given are the best available anywhere on the consumption of coal. Unfortunately, however, they are for 1928 only, so that changes in the consumption during a period of time cannot be determined.

In the country as a whole, electric public utility power plants consumed 39,788,000 tons of bituminous coal in 1928 (Table 55). Pennsylvania led in the amount of the coal supplied to the plants. Central Pennsylvania supplied 5,734,000 tons; western Pennsylvania, 4,170,000 tons; and Somerset-Meyersdale, 1,479,000 tons. Southern West Virginia mines supplied 8,086,000 tons. The plants consumed 7,974,000 tons of the comparatively low-grade coal of Illinois and Indiana, but outside the northern and southern Appalachian areas (extending as far south as Tennessee) and the western Kentucky and Illinois-Indiana areas only 4,348,000 tons of bituminous coal was consumed by the industry. Consumption was especially small in the Rocky Mountain states because of the use of water power; it was small in the southwestern prairie states because of the wide use of oil and gas. Moreover, neither in the Rocky Mountain area nor in the southwestern area is there heavy demand for industrial power.

Coal supplied to power plants by mines in the central Pennsylvania district and in the Somerset-Meyersdale district was used mainly by power plants in New England, eastern New York, New Jersey, Delaware, Maryland, and the District of Columbia, and in Pennsylvania east of the Allegheny Mountains. The consumption by electric utilities of coal mined in the western Pennsylvania district (not including the Panhandle of West Virginia) was mainly in New York state (probably the western part), Ohio, and Wisconsin, and in Pennsylvania west of the Allegheny Mountains.

Electric power plants are not limited in their use of coals to certain grades. The grade of coal, however, affects the selection of coal-burning equipment. The low ash, high-fusing ash, caking coals of the Appalachian fields are burned most

Table 55
BITUMINOUS COAL USED BY ELECTRIC PUBLIC UTILITY POWER PLANTS IN THE UNITED STATES
BY CONSUMING AREA AND BY ORIGINATING AREA, 1928
 (Thousands of Net Tons)

Consuming Area	Originating Area												Total
	Central Penn-sylvania	Western Penn-sylvania	Somer-set-Meyers-dale	Cumber-land-Pied-mont	Ohio	Northern West Vir-ginia and Panhandle	Southern West Virginia	Vir-ginia	Eastern Kentucky and Tennessee	West-ern Ken-tucky	Illinois-Indiana	Other States	
New England.....	478	11	173	17	0	172	1,984	0	0	0	0	0	2,835
New York-New Jersey													
New York City Area....	3,090	0	990	393	0	0	1,532	179	0	0	0	0	6,183
New York, Other.....	252	161	17	0	265	35	0	0	0	0	0	0	730
New Jersey, Other.....	53	0	54	15	0	0	0	0	0	0	0	0	121
Pennsylvania													
East of Alleghenias.....	1,422	25	127	28	0	3	0	0	0	0	0	0	1,605
West of Alleghenias.....	287	1,852	0	0	0	15	1	0	0	0	0	0	2,156
Delaware.....	76	0	0	3	0	0	18	0	0	0	0	0	97
Maryland and District of Columbia	73	0	104	273	0	0	330	0	0	0	0	0	780
West Virginia.....	0	0	3	41	0	790	769	0	0	0	0	0	1,603
Ohio.....	4	1,325	10	0	1,328	272	998	0	224	0	0	0	4,161
Michigan.....	0	0	0	0	0	3	1,312	2	1,055	0	0	5	2,377
Illinois-Indiana													
Chicago Area.....	0	13	0	0	0	0	22	0	11	459	3,401	0	3,907
Illinois, Other.....	0	0	0	0	0	0	0	0	0	571	1,733	0	2,304
Indiana, Other.....	0	0	0	0	0	0	118	1	196	81	1,927	0	2,324
Wisconsin.....	0	724	0	0	0	7	20	0	13	2	83	0	849
Minnesota.....	0	10	0	0	0	1	153	0	38	39	150	33 ^b	423
Iowa.....	0	1	0	0	0	0	0	0	0	203	207	465	875
Missouri.....	0	0	0	0	0	0	3	0	0	86	313	798	1,201
Other States.....	0	49	0	0	0	0	826	311	306	557	160	3,047 ^b	5,256
Total.....	5,734	4,170	1,479	769	1,594	1,299	8,086	494	1,842	1,999	7,974	4,348^b	39,788

Source: William Harvey Young, *Sources of Coal and Types of Stokers and Burners Used By Electric Public Utility Power Plants*, The Brookings Institution, Pamphlet Series, Vol. II, Number 2, December 31, 1930, pp. 72-79. Totals are based on exact figures, not on rounded numbers.

^a Less than 500 tons.

^b The Minnesota data include 29,464 tons, and the North Dakota and South Dakota data, 9,026 tons of Appalachian coal received from the lake docks; the originating state for this tonnage could not be ascertained.

frequently on underfeed stokers; the high ash, low-fusing ash, non-caking coals of the middle western fields are burned principally on chain-grate stokers.⁴⁵ Burners using pulverized coal, however, consume coal ranging from the lignite of Texas and North Dakota to the anthracite of Pennsylvania.⁴⁶ It appears, therefore, that the grade of coal is not a deciding factor, except within wide limits, in the choice of coal to be used in the power plants; though it must be realized that equipment for burning one type of coal, once installed, cannot be changed without considerable expense.

Heat value of coal determines to a large extent the distance which the coal may move to the electric power market.⁴⁷ The high British thermal unit coals of the Appalachian region move to power plants in numerous states, whereas the lignite of Texas moves only short distances. The decisive factor in the competition for the electric power market among mines producing coals of approximately equal heat value is evidently the price of the coal delivered at the plants.

⁴⁵ William Harvey Young, *Sources of Coal and Types of Stokers and Burners Used by Electric Public Utility Power Plants*, The Brookings Institution, Pamphlet Series, Volume II, December 31, 1930, p. 33.

⁴⁶ *Ibid.*, p. 33.

⁴⁷ *Ibid.*, p. 31.

CHAPTER 9

Summary of Regional Changes and of Their Causes⁴⁸

Changes in Production

Bituminous coal production in Pennsylvania has shown a steeply downward trend since the World War period. In 1929, a year of extraordinary activity in business generally, Pennsylvania production was 19.6 per cent less than that in 1918, the all-time peak, and 17.4 per cent less than that in 1913. Ohio coal production fell even more rapidly than Pennsylvania production. On the other hand, coal production in West Virginia, eastern Kentucky, and Virginia showed sustained gains. The gains, in fact, were so large that they more than offset the losses in Pennsylvania and Ohio. Total national production since the War has not reached in any year the peak of the War period, but the national production has shown no such slump as that of Pennsylvania.

Among various Pennsylvania mining areas, there have been significant differences in trends of bituminous coal production in the post-War period. In Greene County, where numerous new mines have been brought into production, the trend has been decidedly upward. In almost all other counties, there have been declining trends. Certain counties, mainly Westmoreland, Clearfield, Jefferson, Centre, and Tioga counties, have encountered exceptionally adverse conditions; production in those counties has shown a disastrous decline.

Although post-War declines in bituminous coal production in certain localities of Pennsylvania may have resulted from exhaustion of coal resources, the decline in the state as a whole and in each of the major producing districts of the state is not attributable to exhaustion of resources. The coal mines of the state did not reach such an advanced stage of exploitation before the War that there was rapid exhaustion during and after

⁴⁸The reader is referred to the Introduction, pp. 7-10, *supra*, for a description of the data used in this study. It is pointed out there that detailed figures on the distribution of coal by fields and by markets are available generally for only 1917, 1918, and 1929. Throughout the study these comprehensive distribution data have been supplemented, wherever possible, by other records.

the War. Quite the contrary. Pennsylvania has enough recoverable bituminous coal to last for two centuries even if the coal were removed at the highest annual rate known. Of course, under the usual practice by which the most accessible coal is removed first, increasing difficulty is encountered in mining operations. Undoubtedly coal mined at the present time is less accessible than that mined many years ago. Viewed from the standpoint of the state as a whole, exhaustion of bituminous coal resources has a very gradual though unremitting influence on the capacity to produce. There is nevertheless little reason to believe that increasing inaccessibility was the dominant factor in the sharp reversal of trend during the War period.

Changes in Market Channels

There has been considerable change since the War period in the marketing channels for Pennsylvania bituminous coal. Railroad shipments have declined; river shipments, on the other hand, have increased markedly, the tonnage being almost three times as great in 1929 as in either 1915 or 1916. Most of the coal shipped on the rivers is used for by-product coke making in plants along the rivers. The increase of shipments on the rivers reflects in part the rapid growth of the by-product coke industry in western Pennsylvania. The tonnage of coal made into coke in beehive ovens at coal mines decreased rapidly after 1916; the tonnage used in beehive coking was only one-fifth as much in 1929 as in 1916. Bituminous coal mines of the state have used decreasing amounts of coal for their own power and heat. Sales to local trade, reflecting mainly truck and wagon shipments, have shown a considerable growth, although even in 1929 they constituted less than six per cent of the state's production.

Part of the coal loaded for railroad shipment moved to market by all-rail routes; part was transferred to lake vessels for shipment on the Great Lakes or for vessel fuel; and part was loaded into vessels at tidewater piers for export, for coastwise trade, or for vessel fuel.

All-rail shipments of Pennsylvania bituminous coal were about equal in 1915 and 1929; they showed a mildly declining trend, however, during the post-War period. In 1929, all-rail shipments (excluding railroad fuel) to points in Pennsylvania

were much larger than in 1915 but smaller than in the War years 1917 and 1918; such shipments to points in the United States outside Pennsylvania showed an opposite trend—lower in 1929 than in 1915 and higher than in 1917 or in 1918. Railroad fuel coal hauled by all-rail routes showed a downward trend from 1915 to 1929, and so did all-rail exports to Canada.

Rail-lake shipments of Pennsylvania bituminous coal declined rapidly both during and after the War; they reached low ebb in 1925, when wage-rate differences between the northern and the southern Appalachian fields probably reached a maximum. Since 1925 the shipments have shown a rising trend. Use of Pennsylvania bituminous coal as fuel for lake vessels has decreased materially during the past 20 years, in spite of the fact that total shipments of coal on the lakes (from both the northern and the southern Appalachian fields) have shown a large growth. During the same period, deliveries of Pennsylvania bituminous coal by lake to railroads for use as railroad fuel also have shown a marked decline.

Rail-tidewater shipments of Pennsylvania bituminous coal have declined rapidly during the post-War period. Decreasing amounts of coal from Pennsylvania have been supplied for fuel to vessels engaged in foreign trade; decreasing amounts have been exported by tidewater; and decreasing amounts have entered coastwise trade. Vessel fuel coal supplied at Atlantic ports to vessels engaged in domestic trade has not shown a perceptible advance or decline in trend.

Changes among Major Groups of Bituminous Coal Consumers

About one-fifth of the bituminous coal produced in Pennsylvania during 1928 and 1929 was consumed by steam railroads, and the proportion consumed in 1916 and 1917 was approximately the same. Pennsylvania mines, however, supplied only four-fifths as much coal to railroads in 1929 as in 1917. Railroad consumption in the United States also showed a downward trend during the period; but, even so, Pennsylvania's share in that market decreased.

Changes in the share, however, were not uniform among mining districts in the state. The Somerset-Meyersdale district

supplied only about one-third as much railroad coal in 1929 as in 1917; the central Pennsylvania district, one-half as much. The western Pennsylvania district, on the contrary, supplied an increasing amount.

Of all the factors affecting the distribution of Pennsylvania bituminous coal, the shift from the beehive method to the by-product method of coke making has had the most profound influence. When the beehive method was used, coal was coked at the mine and the coke was shipped to the point of consumption, the iron and steel industry being the dominant consumer. Under the by-product method, the coke ovens are generally adjuncts to iron and steel plants, the coal being shipped from the mines to the plants.

Before the World War, usually more than half the coke of the country was produced in beehive ovens in the Connellsville district, and Connellsville coke was shipped as far as the Rocky Mountain and Pacific Coast states. Since the War, this production has declined rapidly. At present only a small fraction of the nation's coke is produced in Pennsylvania beehive ovens.

Pennsylvania's by-product coke industry has grown rapidly, but not at a sufficient rate to offset the decline in the state's beehive coke industry. The by-product industry has located to a large extent outside the state. Pennsylvania coal has been supplied in increasing amounts to out-of-state ovens, but an increasing share of the coal for those ovens has come from West Virginia and eastern Kentucky.

Pennsylvania's loss in the nation's coke industry is shown by the fact that, even though the combined beehive and by-product coke industry used 82 million tons of coal in 1916 and 87 million tons in 1929, Pennsylvania supplied 50 million tons of the coal in 1916 and only 42 million tons in 1929.

Electric public utility power plants constitute a major outlet for Pennsylvania bituminous coal. In 1928 these plants consumed nine per cent of the state's output. About one-third of Pennsylvania bituminous coal used for generating electricity was consumed in Pennsylvania and about one-third in the New York City area. Large tonnages also were consumed in Ohio, Wisconsin, and New England.

Although exact data on the long-time trend of consumption of Pennsylvania bituminous coal by electric public utility power plants are not available, there are sufficient data to show conclusively that the trend has been markedly upward. It is important to keep in mind in considering changes in the consumption of coal, however, that manufacturing plants and coal mines have increasingly substituted purchased electrical energy for energy formerly generated directly in their own power units. The increase in consumption of Pennsylvania coal by central electric power plants is undoubtedly offset wholly or partially by decreases in consumption of the state's coal directly by factories and by coal mines. The generating efficiency of electric power plants has vastly improved, the result being that coal consumption by the plants has not increased as rapidly as the energy output.

Changes within Major Market Areas

(a) Pennsylvania

During the period 1915-1929, Pennsylvania provided the largest outlet for its own bituminous coal, but the state consumed coal in decreasing amounts. Railroad shipments to points in the state (excluding railroad and vessel fuel) increased from 1915 to 1929, but they decreased from 1917 and 1918 to 1929. Shipments on the Monongahela, Allegheny, and Ohio rivers (mostly to points in the state) increased three-fold from 1915 to 1929.

Manufacturing establishments in the state other than coke plants also were large consumers of the state's bituminous coal. The trend of their consumption was probably downward from 1917 to 1929. Very little of the state's coal was used in the manufacture of artificial gas in Pennsylvania. The availability of natural gas no doubt was the reason. Coal made into coke in beehive ovens at mines amounted to less than one-fourth as much in 1929 as in 1915. Coal made into coke in by-product ovens in the state but away from the mines showed a large gain, although not nearly enough to compensate for the loss in beehive coking at the mines.

The amount of coal used by coal mines in the state for their own power and heat was only about one-third as much

in 1929 as in 1915. The mines undoubtedly purchased increasing amounts of energy from electric public utilities. Other mines and quarries in the state consumed very little of the state's coal—less than four-tenths of one per cent in 1929.

Electric public utilities in the state nearly doubled their consumption of the state's coal from 1917 to 1929. These plants supplied increasing amounts of power to manufacturing establishments and to mines; this substitution of purchased electrical energy for energy which the factories and the mines formerly supplied themselves accounted for at least part of the decreased use of coal at factories and at mines.

Consumption of coal for domestic heating in the state amounted in 1917 (the latest year for which data are available) to only a little more than one per cent of the state's production. Natural gas and anthracite coal, of course, were used in large amounts for this purpose.

(b) *New York*

From 1917 to 1929, rail shipments of Pennsylvania bituminous coal to New York state increased, and both central Pennsylvania and western Pennsylvania participated in the gain; shipments by lake also increased; but shipments by tidewater decreased. In the aggregate, Pennsylvania probably supplied more coal to New York state in 1929 than in 1917; but Pennsylvania's percentage in the total coal taken by the state was reduced. Northern West Virginia made relatively larger gains than did Pennsylvania in the volume of rail shipments to New York, and the southern Appalachian fields gained relatively in the tidewater shipments and probably also in the lake shipments.

Western New York had a rapidly growing by-product coke industry during the period 1917-1929. Mainly Pennsylvania coal was used by that industry in New York, but Pennsylvania's gain in coal tonnage supplied for coking purposes was counterbalanced by losses in tonnage of coal represented in the coke shipments from Pennsylvania ovens to western New York.

(c) *New Jersey*

New Jersey has been a growing market for Pennsylvania bituminous coal. Coal shipments from central Pennsylvania to New Jersey more than doubled between 1917 and 1929. On the other hand, shipments from western Pennsylvania to New Jersey fell by more than half during the same period. New Jersey has had a growing by-product coke industry since the War, but Pennsylvania supplies almost none of the coal for the coke industry in New Jersey. Moreover, shipments of Pennsylvania coke to New Jersey have decreased markedly.

(d) *New England States*

The amount of Pennsylvania bituminous coal supplied to New England showed a downward trend during the period 1915-1929. The decline in rail shipments of coal to New England was especially marked, but tidewater shipments also were smaller. Total bituminous coal receipts in New England showed a slightly downward trend from 1917 to 1929. An increasing amount of the business was taken by the southern Appalachian fields, which shipped coal by tidewater routes. The by-product coke industry in Massachusetts had a considerable development after the War, but only a small part of the coal for coking came from Pennsylvania—none in 1933. At the same time, shipments of coke from Pennsylvania to New England decreased. Thus, both directly and indirectly, Pennsylvania's share in the New England market decreased.

(e) *Ohio*

Shipments of Pennsylvania bituminous coal to Ohio in 1929 were 50 per cent greater than those in 1917 and more than 100 per cent greater than those in 1915. In spite of these large gains, Pennsylvania's share in the Ohio markets was about the same in 1929 as in the earlier years. A large part of the increased use of coal in Ohio has been for the state's rapidly expanding by-product coke industry. Before the War, Ohio consumed annually millions of tons of Pennsylvania coke, but in recent years this consumption has fallen to a fraction of its former amount. Pennsylvania has been shipping large tonnages of coal to Ohio for coking, and the increase in

these shipments accounts for most of the increase in total shipments of bituminous coal to that state. Shipments of coking coal, however, have not increased sufficiently to offset decreases in the volume of coal used to produce the coke shipped to Ohio.

Practically all of Pennsylvania's bituminous coal shipments to Ohio originate in western Pennsylvania. Ohio, West Virginia, and eastern Kentucky mines are the major competitors.

(f) *Michigan, Illinois, and Indiana*

In 1915, Pennsylvania shipped large tonnages of coal by railroad to Michigan, Indiana, and Illinois. During the time of our participation in the World War, these markets were almost completely lost by Pennsylvania producers, and they have not since been regained. Although freight rates for rail shipments from western Pennsylvania to most of the important consuming centers in these states are the same as those from the major competitive fields in southern West Virginia and eastern Kentucky, the western Pennsylvania mines have been unable to compete since the War in the rail shipments. They do offer considerable competition, however, in the shipments by lake. The shorter hauls required for Pennsylvania shipments are at least in part taken into account in the rail freight rates for the lake cargo coal, but they are not allowed for in the all-rail rates.

(g) *Other States*

Before the War, Pennsylvania shipped appreciable tonnages of coal by rail to such distant states as Wisconsin, Missouri, and Louisiana. During the War these shipments fell to a negligible amount, and they have not been regained since the War.

High Lights of Regional Shifts

The national production of bituminous coal reached a peak in the War period and has held to somewhat lower levels even in the best years since. The great over-capacity developed during the War and the early post-War years very much

intensified competition in the bituminous coal industry. Economies in the use of coal and increasing use of competitive fuels further restricted the opportunities of bituminous coal producers and further intensified their competition.

Out of the desperate fight for coal markets have come important regional shifts in production. Production in Pennsylvania and Ohio has lost relatively more than the national production. The Illinois-Indiana region also lost heavily. Southern Appalachian fields (in southern West Virginia, Kentucky, Tennessee, and Virginia) have gained.

Pennsylvania producers have held most of the market within the state. In all-rail shipments to parts of adjacent states west, north, and east, Pennsylvania producers have fairly well maintained their market. On shipments sent to tidewater and distributed by vessels, Pennsylvania fields have not been able to maintain much volume against the huge tidewater deliveries through Hampton Roads from southern Appalachian fields. In shipments sent to ports on the Great Lakes and distributed by vessels, Pennsylvania and Ohio producers lost ground until shortly before the depression struck. Part of the lakes market has since been regained by the northern Appalachian producers.

Within Pennsylvania, a regional shift of importance resulted from an extensive substitution by railroads of high-volatile coals from western Pennsylvania for the low-volatile coals of central Pennsylvania.

The greatest of all the changes affecting the Pennsylvania outlets was the shift from the beehive coking process to the by-product coking process. The by-product method made possible the use of a wider variety of coals, much wider producing areas became eligible competitors in the market for coking coal, and Connellsville lost its unique position as the coking center. The extensive development of by-product coking plants in other states formerly serving as large markets for Pennsylvania coke caused heavy losses in out-of-state coke shipments. The loss in coal tonnage represented by this decline has only in part been offset by shipments of coking coal from Pennsylvania to out-of-state by-product coke plants.

Basic Causes of Shifting and of Instability

Significant causes of the regional shifting and instability characteristic of the soft coal industry, brought out at appropriate points in the preceding chapters, have been found to lie in part immediately in the coal industry itself and in the circumstances peculiar to that industry, in part in the channels through which the coal industry must reach its market, and in part in the vast market to which the flow of coal is directed. The causes that appear to lie in separate grooves, however, are so much interrelated and overlapping that a simple pattern and an easy sequence of statement are impossible.

At the background of the complex of causes of instability are these two mighty influences:

1. Great over-capacity of existing mines, under ownership so decentralized that control of output is impossible
2. Tremendous latitude for the opening of new mines, afforded by huge resources scattered over wide areas

The industry, already over-expanded and always threatened with further expansion, looks toward markets in which consumers' demands for bituminous coal are continually varying because of

1. Wide boom and depression swings, as well as sharp seasonal changes, in demand
2. Geographic spread and shift of coal-consuming industries
3. Changing industrial constituency in the respective market areas
4. Technological changes vitally affecting demand with respect to both types of coal and amount of coal
5. Rising importance of competitive fuels

Between producers in an over-expanded industry and markets characterized by continual change, the agencies of transportation engage in rivalry for traffic. The major carriers, of course, are the railroads and the steamship companies, although trucking has had a significant increase in importance in some sections. Our regulation of railroads renders the railroad freight-rate structure difficult of adjustment, but not impossible; there is scant regulation of steamship freight rates and of trucking rates. In transportation of coal, the competitive

position of producers, fields, and areas may have been changed, or may be significantly changed, by

1. Occasional limited changes of railroad freight rates
2. Occasional favoritism in the granting of railroad service, particularly in periods of car shortage
3. Practical freedom of steamship companies and truckers with regard to rates and allocation of equipment

While transportation agencies vie with each other for traffic, both operators and consumers—particularly large consumers—actively favor rate changes that look favorable to them and actively fight those that look unfavorable. All in all, however, transportation rates affecting the larger part of the coal moved are comparatively inflexible. Consequently, operators can feel reasonable assurance in holding the markets they have and in gaining new markets only if they offer attractive prices at the mines—sufficiently attractive to offset, or slightly more than offset, any existing excess of transportation cost over that from competing fields. In order to offer an advantageous f.o.b. price, operators must deal strenuously with operating costs, and this strenuous dealing may be manifest in either one or any combination of these actions:

1. Shift operations to more accessible seams, even though those abandoned may contain much good coal
2. Further mechanize operations and displace men
3. Hold down or actively depress wage rates

In the following chapters consideration will be given to the question whether it represents social sanity to tolerate so great an interplay of disturbances and jeopardies in an industry whose successfully maintained operation is indispensable to any hope of economic stability and prosperity. Various classes of remedial proposals aimed at the disturbing influences will be examined, and suggestions will be made of what seem to be essentials in a national policy for the bituminous coal industry.

PART II

PUBLIC INTEREST
AND A
NATIONAL POLICY

CHAPTER 10

Public Interest in the Bituminous Coal Industry

Shifts in the distribution of bituminous coal from one producing area to another have had pronounced effects not only on the welfare of the producing areas concerned but also on the general welfare of the entire country. The bituminous coal industry has often been described as a "sick" industry. Even in times of "normal" and above-normal business activity, the industry has been far short of sharing in the general prosperity; and the plight of numerous stranded mining communities has directed the attention of the nation to some of the more obvious sore spots. Not all the ills of the bituminous coal industry can be laid directly to shifts in the demand for coal from one producing district to another, but those factors which encouraged such shifts were, and are, the underlying causes of most of the grief in the industry.

It is true that some of the shifts in production may be considered beneficial from the standpoint of the national economy as a whole. Technological developments in the use of coal which resulted in shifts in the type of coal specified, no doubt, caused also some shifts of demand among producing areas. Such developments to the extent that they resulted in more economical use of coal should be considered as social gains; but they were not clear gains by any means, for the shifts in production resulting from these developments caused as much distress in the coal fields as shifts resulting from other causes. For many of the shifts in coal mining little or no social gain can be shown to offset the harm done.

What have been the net effects of unbridled change in the bituminous coal industry? First, a tremendous over-capacity has been developed. Much of the expansion in capacity, of course, must be ascribed to exceptional demand for coal resulting from the high level of business during the War and early post-War periods. Labor disturbances and the method of allocating cars

in periods of car shortages also contributed to the over-capacity. Taxation of unused coal lands has probably encouraged overdevelopment of coal resources. A large over-capacity, however, has been developed as the direct result of shifts in coal production. This over-capacity is in men, capital investment, and physical equipment. Tens of thousands of men are no longer needed in the industry, and a demand for coal large enough to call for their services in the future seems unlikely. Over-capacity causes irregular operation, which in turn results in much lost time for employed miners. The fact that consumers know that coal can be secured easily at almost any time of the year restrains them from developing storage capacity to take care of seasonal peaks in their coal demands.

Second, wastage of coal resources has resulted. Mines abandoned because of loss of markets are allowed to become flooded. Collapse of timbers renders much coal irrecoverable. Moreover, the effort to hold markets by cutting prices leads to the mining of only the best and most readily accessible coal; and this skimming leaves large quantities of coal irrecoverable, or recoverable only at high cost.

Third, the effort to take new markets or to retain old markets by cutting prices has placed tremendous pressure on wages. Reduction of labor costs has enabled some operators at one time and others at another time to record gains. Both the gains of southern fields after northern operators had signed the Jacksonville agreement and the partial recovery of markets by Pennsylvania and Ohio operators after the abandonment of the Jacksonville agreement are illustrative. Cutting wages, however, is a game that all can play, and advantages accruing to any district from such a policy are likely to prove transitory. Resistance to wage cutting by unions has led to much strife, and the ill-organized but often fierce resistance in non-union fields fill the records. But the battle was in almost all cases a losing one. The strength of the union in some districts proved to be its weakness, for those districts were all but shut out from many markets because of relatively high labor costs and because of irregularity of operation occasioned by strikes.

Fourth, the mine price of coal has probably been lower than it would have been had everything been serene in the industry

and had not the shifts in production taken place. Consumers have, no doubt, reaped some advantage, but it has been at the expense of miners and their families and of investors in coal-mining properties. In the long run, it has been at the expense of the nation. Then, too, the effect of a reduction in the mine price is to a great extent lost in the delivered price of coal. Freight charges have a large influence on the delivered price of coal, being to many places several times as great as the mine price. To small consumers the cost of local distribution also adds substantially to the delivered price. At times, shortages of coal caused by labor disturbances in the coal fields have resulted in higher prices. There seems little doubt that the savings of consumers by reason of low mine prices for coal, although in the aggregate such savings may be very large, are small in relation to the total delivered cost of coal and are heavily outweighed by the losses sustained by the coal industry.

Fifth, consumers have not at all times received adequate supplies of coal from the industry. A car shortage was the cause of insufficient supplies during the War. This shortage can be partially ascribed to the general organization of the coal industry. Inefficient use of the car supply results from the necessity of providing numerous scattered mines with cars to load. Long-haul transportation of coal, when nearby mining capacity is unused, also results in inefficient use of cars. In 1919, and again in 1922, strikes in the coal industry resulted in serious coal shortages. Since 1922, consumers have not been seriously threatened with a coal shortage, largely because of the growth in capacity in non-union coal fields. The prime requisite of an industry essential to the entire industrial life of the country is that its customers be assured of an adequate supply of its commodity at all times. The coal industry has failed to meet this requirement in several periods of its history. And even with its present over-capacity, it cannot provide guarantees that it will not fail again.

The net effect of change in the bituminous coal industry is much human hardship and misery. Until recently the plight of coal miners was not regarded as a problem of the nation as a whole. To alleviate their plight, local charity—ordinarily very limited—was all that was available. With the advent of the

depressed thirties, the idea that society as a whole was responsible for the care of those unable to find sustaining employment became current, and the assumption of relief by the Federal Government was the result. Even with the prevailing low relief standards (low in terms of minimum health and comfort standards), many miners' families have fared better under Federal relief than they did during periods of so-called prosperity. It seems justifiable that when society as a whole is forced to assume the responsibility for conditions arising out of a badly ordered industry, it should have a voice in the policies of that industry. Moreover, bituminous coal is essential to the industrial life of the country. If the nation failed to receive its supply of coal, industry would be crippled and chaos would threaten.

The welfare of the nation depends to a great extent on bituminous coal, and the public interest requires adequate supplies of low-cost bituminous coal at all times. Guarantee of this requirement cannot be made unless the coal is produced efficiently, and sustained efficiency is hardly conceivable unless the welfare of those engaged in the industry is elevated to, and maintained at, a decent level. In short, there seems to be little room for doubting that the coal industry is intimately linked with the public interest.

CHAPTER 11

Examination of Proposed Remedies

Many clamorous appeals from miners, operators, and the public alike have been made for the Federal Government to take a hand in the bituminous coal industry. It seems desirable, therefore, to review the several types of proposals bearing on public policy toward the soft coal industry. These proposals may be grouped as follows:

1. To go back to the narrowest and simplest relationship between government and industry, that is, to follow a rigorous "night-watchman" theory of government
2. To leave things as they are
3. To relax the laws against business combinations and
 - (a) permit organized self-regulation in the industry, or
 - (b) positively foster or compel self-regulation
4. To do nothing about instability in the industry, but to use public and private means to absorb the shock of changes, to relieve distress of the miners, and to institute vocational training and kindred measures of rehabilitation
5. To depend on regulation by the several states
6. To provide Federal regulation
7. To nationalize the industry

The problems to be solved by a national policy directed toward remedying the ills of the bituminous coal industry are numerous, but three guiding principles can be stated simply:

1. The continuing provision of coal at as low a cost as is consistent with
2. A decent livelihood for those engaged in the industry and with
3. Rational conservation of coal resources.

The Law of the Jungle

If the narrowest view of the functions of government is to be adhered to, backward steps must be taken in the relations of government to the bituminous coal industry. Laws regarding safety and compensation must be abrogated. Regulation of freight rates must cease, and the fixing of rates must be left entirely to ruthless competition among railroads and to bargaining of coal operators, railroads, and coal consumers. No more state and Federal relief can be given to destitute miners. The resulting chaos can well be imagined. Attainment of any of

the primary objectives would not stand even in the fringes of such a program. No doubt the number of advocates for such measures would be small. Obviously, the problems of the industry will not be solved by abandoning the social advances that have been made.

The Status Quo

Another possibility is to leave things as they are, in the hope that the ills of the industry will cure themselves, that surplus miners will eventually find other employment, and that the existing over-capacity will be reduced either through increased demand for coal or through the failure of mining companies.⁴⁹ But "things as they are" include factors that have been highly conducive to upsets and persistent instability, particularly the sustained threat of added expansion, the lack of consistency in existing regulatory policies with reference to competing sources of energy, and the perpetual jockeying with wage rates in order to gain advantages in labor cost. An epidemic left alone probably would "cure itself." The Black Death did—after destroying a third or a half of England's population.

Industrial Self-Government

It is frequently proposed that the industry (i.e., the operators) be allowed to work out their own problems and that the antitrust laws be relaxed to permit combination of coal companies in the marketing of coal. Under such a public policy, it is to be expected that some combination of the sales activities of coal companies would occur, but the history of centralization provides little basis for the belief that in the bituminous coal industry, with its great diffusion of ownership, the results would be substantial. Control of production and of prices within a producing field might be attained, but it is doubtful that the divergent interests of the several producing fields could be harmonized. The chances that centralization of the actual ownership of coal resources will grow to the point at which monopoly or semi-monopoly control is possible seem very slim. Large industrial consumers already have a vast investment in coal mining

⁴⁹National Industrial Conference Board, *The Competitive Position of Coal in the United States*, p. 269.

properties, and such investments would no doubt be increased if the threat of monopolistic control of prices appeared.

If it be assumed that widespread combination is actually possible in the bituminous coal industry, what would its effects be with regard to (1) the price of coal and (2) the provision of an adequate livelihood for those engaged in the industry? No doubt the price of coal would be increased, but the ability of many consumers to turn to substitute fuels would provide an important check. Those controlling prices would have to decide to what extent they are willing to sacrifice volume for a greater profit margin per ton of coal. It is also extremely doubtful that labor would secure substantial advantages. True, the pressure to reduce wages which results from cutthroat competition would be greatly lessened, and elimination of the shifts in production from one area to another would stabilize employment to a large extent. It is unlikely, however, in view of the existing large supply of labor, that substantial advantages to labor would be granted by the controlling agency without mass pressure from the workers. Concentrated ownership would be better able than scattered ownership to break up such mass pressure through the ability to shift production from one district to another. Furthermore, seasonal and cyclical fluctuations in the demand for coal seriously limit the ability of the industry to stabilize employment.

In summary, it may be said that effective self-regulation of the bituminous coal industry is, in the nature of the industry, very unlikely, and that, even though the industry through extensive combination of operating units were able to regulate itself, such regulation would probably not be in the public interest.

Relief and Welfare Measures

Steps have been taken and lines of action have been proposed to mitigate the effects of unregulated competition in the coal industry. Among these may be listed the various attempts to aid miners in raising a portion of their food requirements. Subsistence homestead projects for unemployed miners in general require the miners to leave the uncertainty of mining for partial assurance of their food supply; but employment to fill the other needs of miners' families cannot be assured. Other proposals call for gardening by unemployed and partially employed

miners while they remain available for work in the industry. Through the provision of part of their own food supply the extreme destitution of the family is relieved somewhat, and they probably obtain a more adequate and varied diet; but the over-supply of miners is not reduced.

Federal relief, no doubt, has improved the condition of unemployed miners, but the huge relief expenditures involved cannot be continued indefinitely. Even if they could be, it is undesirable to continue them long. The miners do not want continued relief any more than the public wants to continue it. The need is for a more constructive program which would place the miners in a position to contribute to the general economic welfare of the country and to enjoy the satisfaction of living from their own earnings. Vocational training to fit unemployed or under-employed miners for other occupations is a worth-while activity; but at present its results are bound to be meager in terms of men actually placed in new employment, because of the general over-supply of labor available to most industries. Also, the results are likely to be meager if the training is directed toward hand production of novelties, baskets, wicker furniture, rugs, coverlets, and other such products for which—because of cheap machine-made competitive products—there is no substantial demand.

In general it may be said that these programs aid in the alleviation of distress in mining communities, but they do not attack the underlying factors causing distress. The dilemma of such social service work is that misery may be created as rapidly as it is relieved. It is too much like attempting to fill a sieve with water.

Regulation by the States

The feasibility of state regulation or control of the bituminous coal industry as a solution for the ills of the industry may be dismissed with little comment. So far, state regulation has been concerned mainly with safety and with compensation for injuries. An attempt was made a few years ago by one state (Ohio) to favor coal produced within the state by requiring railroads to reduce rates on intrastate shipments of coal. The reduced rates, however, were declared by the Interstate Commerce Commission to be unduly prejudicial to interstate com-

merce and were ordered rescinded. The Commission was upheld by the United States Supreme Court in this action.

Public institutions in Michigan were required by the legislature to use only the high-cost coal produced in that state, after miners had camped in the State Capitol. These measures represent the philosophy of economic sectionalism carried to the extreme. A large proportion of the coal produced in the country enters into interstate commerce,⁵⁰ and regulation by state governments is bound to be ineffective, especially any regulation which increases the cost of coal by requiring that the social costs incurred in the production of coal be included in the price. State workmen's compensation laws, with their wide variation and their general inadequacy, are outstanding examples of the futility of state regulation of production for interstate markets. By enforcing adequate standards, a state stimulates production in competing states. By employing discriminatory measures in favor of its own producers, a state deepens the distress of competing states.

Federal Regulation

Most proposals for public action in the bituminous coal industry have involved the powers of the Federal Government, it being more or less universally recognized that the distribution of the industry over many states makes state action ineffective. Moreover, the problems of bituminous coal production cannot be separated from the problems of its transportation, and the fact that most of the coal enters into interstate commerce further complicates the problems. Private regulation of the industry promises little. It is likely to be ineffective and if it could be effective it would probably not be in the interest of all concerned—the miners, the consuming public, the operators, and the investors. There is more promise in Federal regulation.

In the past, various activities of the Federal Government have been concerned with the bituminous coal industry. The United States Geological Survey is engaged in determining the location and the extent of coal reserves. The United

⁵⁰ The extent to which bituminous coal moves in interstate commerce is discussed in Appendix B, pp. 181-183.

States Bureau of Mines is concerned with technical problems of mining, with the promotion of accident prevention and safety work, and with the collection of statistics on the industry. These two agencies provide needed information to the industry and to the public, but their activities can hardly be called regulatory.

A third Federal agency whose activities more nearly approach regulation of the coal industry is the Interstate Commerce Commission. The Commission is not directly concerned with the mining of coal, but its decisions with respect to the reasonableness of freight rates on coal have a profound bearing on the ability of coal-producing fields to compete in various markets. In addition to the regulation of freight rates, the Commission is charged with responsibility for a fair distribution of cars to mines, especially important in times of car shortages. To date, the Interstate Commerce Commission has apparently hesitated to make full use of its power to determine rates that are not "unduly preferential or prejudicial" in the interest of stability in the bituminous coal industry.⁵¹

The United States Coal Commission was established in 1922 "for the purpose of securing information in connection with questions relative to interstate commerce in coal, and for other purposes." This Commission was essentially a temporary fact-finding body. It conducted investigations and made a lengthy report covering, for the bituminous coal industry, labor relations, safety, civil liberties, waste, irregular operations, overdevelopment, and transportation. Recommendations, about which little has been done, were also made by the Commission. These recommendations will be discussed later.

(a) *Fuel Administration in the War Period*

Because of the exceptional demand for coal arising from War activities, the United States Fuel Administration was created to regulate both the prices and the distribution of coal. The objective of the Fuel Administration was not stability in the industry but the provision at "reasonable" prices of the very large quantities of coal needed by the industries supplying war materials. When the Fuel Administration dis-

⁵¹ Harvey C. Mansfield, *The Lake Cargo Coal Rate Controversy* (New York: Columbia University Press, 1932), especially Chapter VIII.

continued its control, the industry returned to a highly disorganized state aggravated by conditions arising out of the War.

(b) *Bituminous Coal Code under NRA*

The most recent regulation of the bituminous coal industry by the Federal Government occurred under the National Industrial Recovery Act. Under this Act the operators were required to abide by a code of fair competition. This Code—The Code of Fair Competition for the Bituminous Coal Industry—called for (1) the maintenance of minimum prices and (2) elimination of unfair competitive practices. The Code had the force of law and was binding on all operators. In addition, the operators were required (1) to observe certain conditions regarding hours and wages, (2) to bargain with the representatives chosen by their employees, and (3) not to interfere with the free choice of representatives by their employees. The Code was in force from October, 1933 to May, 1935; in the latter month the Schechter case decision by the Supreme Court⁵² led to the abandonment of the codes. The Code imposed self-regulation on the industry rather than Federal regulation. The power of the Federal Government, however, was placed behind the industry to enforce compliance with the provisions of the Code. Experience under the Code was of such a short duration that scarcely any conclusion can be drawn regarding its effect on long-time trends in the industry.

(c) *Guffey-Snyder Coal Act*

The Bituminous Coal Conservation Act of 1935 (commonly referred to as the Guffey-Snyder Coal Act) was passed in August, 1935 to take the place of the abandoned Bituminous Coal Code. This Act creates a National Bituminous Coal Commission in the Department of the Interior to administer the provisions of the law. To enforce compliance, a tax of 15 per cent of the sales value of coal at the mine is levied, with the proviso that a refund of 90 per cent of the tax shall be made to operators complying with the terms of the code provided for in the Act. The Act requires the organization of 23

⁵² U. S. Supreme Court, Nos. 854 and 864 of the October term, 1934. Handed down May 27, 1935.

district boards of coal operators who shall determine minimum prices for coal according to a prescribed formula.⁵³ Such prices are subject to approval by the Coal Commission. Sales below minimum prices are forbidden. "Unfair methods of competition" are listed and banned by the Act. The Coal Commission may set maximum prices if it deems such action to be in the public interest.

Collective bargaining by representatives of the miners' own choosing is explicitly provided. Furthermore, employes have "the right of peaceable assemblage," are "entitled to select their own checkweighman," and are not to be "required as a condition of employment to live in company houses or to trade at the store of the employer." A Bituminous Coal Labor Board of three members is to be created. One member is to be a representative of the employers; one member is to be a representative of the organized employes; and one (the chairman) is to be an impartial person with neither any financial interest in the industry nor any connection with an organization of the employes. The Labor Board has authority to adjudicate disputes arising under the provisions of the Act. It can hold elections to determine who are the freely chosen representatives of the employes. Maximum hours of work agreed on by employers producing two-thirds of the national tonnage and by representatives of a majority of the workers are binding on all code members. Likewise, a wage agreement negotiated in any district by producers of two-thirds of the tonnage and representatives of the majority of workers is binding on all producers in the district.

Consumers are to be represented in the National Coal Commission by a consumers' counsel, who has the right to be heard in all matters affecting the interest of consumers. He may require the Commission to furnish information or to conduct investigations which he deems necessary.

The Guffey-Snyder Coal Act is scheduled for an early court determination of its constitutionality. It is difficult to pass judgment on either the earlier Code of Fair Competition or on the Guffey-Snyder Coal Act, the first because of the lim-

⁵³ Weighted average of costs of production in the minimum price area to which, under the Act, a district belongs.

ited experience under it, as well as because of the authors' lack of opportunity to study its effects comprehensively, and the second because of the total lack of experience. The basic regulatory features of the earlier Bituminous Coal Code have been incorporated into the Guffey-Snyder Act, and a discussion specifically directed to that Act will apply in most respects to the National Recovery Administration Coal Code. Attention will be turned, therefore, to the question whether the factors underlying instability in the industry are likely to be met by provisions contained in the Guffey-Snyder Act. It is understood, of course, that opinions now expressed (October, 1935) regarding the Act are necessarily based on *a priori* reasoning. The ink is scarcely dry on the document, and only time will tell whether the regulatory scheme which it provides will realize its authors' expectations—if, indeed, the courts sanction the experiment.

One of the causes of instability in the coal industry is overdevelopment made possible by the abundance of coal in large scattered areas. There are no provisions in the Act to restrict the development of new mines so that operation of old mines might not be threatened by ruinous competition. Indirectly the establishment of minimum prices will provide some control, because new mines cannot secure the markets of old mines by cutting prices below the minimums set unless they can afford, even when selling at cut prices, to pay the full 15 per cent tax. Undoubtedly, this provision will, to a limited degree, act as a brake on undue expansion. On the other hand, it is possible to see, in the establishment of minimum prices, encouragement for the development of new coal mines. Minimum prices based on the average cost of production mean high earnings for low-cost producers and will attract investment wherever it seems possible to develop low-cost production of coal. Competition from the new low-cost producers will tend to reduce the average cost of production and thereby to reduce minimum prices. Some high-cost producers will no doubt be forced out of business, although the forced retirement of individual operators will not necessarily mean the permanent closing of their mines—perhaps not usually; others

will go into bankruptcy, write down their capital accounts, and continue in production.

It is true that some reduction in the spread of costs among districts can be secured if militant unionism is able to organize the entire industry and reduce differentials in wage rates. Unionism is encouraged by the Act. If such a development occurs, then the opening of new mines for no other reason than that cheap labor can be obtained will be eliminated. Wage rates are to be fixed, however, by negotiations between the operators and their employes in each district, and unless one union represents miners in all districts no coordination of wage rates among the districts will be possible. All in all, the control of capacity through the provisions of the Guffey-Snyder Coal Act seems highly dubious. The highly irregular character of business activity will no doubt lead again to over-expansion.

To what extent will the enforcement of the new Act lead to retirement of part of the present over-capacity of coal mining facilities? The answer appears to be that little if any will be retired as a result of the Act. Of course, much depends on the administration of the Act; but, with minimum prices based on average costs including allowance for depletion, depreciation, and other overhead costs, it is likely that even the higher cost producers will be able to stay in business and make something toward their overhead costs. The extent to which union leaders listen to the plea of high-cost operators for a wage differential in their favor will also have a bearing on the retirement of high-cost mines. The custom of granting operators a thin-seam differential, which gives miners more per ton for work in thin seams but not sufficient to bring up their earnings to the level of those working in thicker seams, is well established in the industry. Then, too, with minimum prices in effect, the spread of prices offered by mines will probably be greatly reduced, if not eliminated; and consumers will have little or no reason to favor low-cost producers.

Other elements disrupting the coal industry are the differences in production costs. It is likely that under the Act differences in production costs will be largely reflected in profits rather than in prices. The aim in reducing costs in the past

has been to increase profits, but the effect in the long run has been the reduction of market prices. Under the Guffey-Snyder Act, the laudable effort to reduce costs through greater efficiency, if successful, will be rewarded with higher profits; but the lowering of prices thereby can come about only to the extent to which such operations result in a lowered average cost in the minimum price area.

It is probable that, under the Act, wide differences in production costs will remain, although some, at least, of the ill effects of changes in such differences may be eliminated through price-fixing. Only experience will tell whether the Act's price-fixing features will introduce some measure of stability in the industry. Maintenance of the present competitive position of the various producing districts, which seems to be an implied purpose of the Act, will, if administrative difficulties can be overcome, constitute a type of stabilization. This type of stabilization, however, would in all probability mean the continuance of much that is uneconomic and antisocial in the industry. A socially desirable type of stabilization would require that the basic causes of instability be eliminated. The elimination would almost inevitably result in some changes in the present competitive positions of the producing districts.

The Act depends on the encouragement of unionism to see to it that labor shares fairly in the industry's returns. Unionism is widespread in the industry. The extent to which wage differentials among districts are reduced depends largely on the attitude and strength of the national union, since wage agreements are on a district basis. It seems that a law aimed at the rehabilitation of the coal industry should provide machinery for the coordination of wage rates among districts, especially when such coordination of minimum prices is provided for. Otherwise, it is difficult to see how the industry's problems can be solved.

The present oversupply of labor is scarcely affected by the Act. The National Bituminous Coal Commission is instructed to study the "rehabilitation of mine workers displaced from employment, and the relief of mine workers partially employed." Perhaps from this study some solution will be derived, but the Act itself is likely to aggravate these problems

if the deductions previously made regarding its effects are substantiated. If demands of the union for a shorter working week are met and weekly wages are held high enough to permit employed miners to earn as much as they previously did, the consumer will pay for the over-manning of the industry in the prices paid for coal, unless he can escape such result by the use of substitute fuel. A shorter working week is not a solution of the problem of unemployment; rather it is a shifting of the burden. The solution of the problem of the surplus mining population awaits genuine business recovery. In the meantime, relief must be given; and vocational training is needed to fit miners for other jobs which promise more for the future than mining. No long-run purpose is served by attempts to "freeze" the present mining population to the industry.

Another important source of instability and injustice in the coal industry is the present system of freight-rate differentials on coal. The Act permits the Coal Commission "to make complaint to the Interstate Commerce Commission with respect to rates, charges, tariffs and practices relating to the transportation of coal and to prosecute the same." It does not seem likely that this power will lead to fulfillment of the recommendation of the earlier Coal Commission that "gradually and without undue violence to established conditions the rates should be readjusted to reestablish more natural relations between the elements of cost and service which will make for economic zoning;" the opinion was expressed that the result of such a readjustment would be a reduction in the total cost of transportation to the nation.⁵⁴ Since the whole tone of the Guffey-Snyder Coal Act implies that its aim is the stabilization of the coal industry with the markets divided among producing fields pretty much as they are now, it is doubtful that the Coal Commission will advocate many changes in freight-rate differentials, unless it can be conclusively demonstrated that the existing differentials are causing substantial shifts in markets from one producing field to another. Limitations on the powers of the Interstate Commerce Commission to alter the freight-rate structure remain as before; interpretation of the Commission's power by itself and by the courts may

⁵⁴ *Report of the United States Coal Commission (1923), Part I, p. 270.*

broaden somewhat the field of its activity, but this broadening process is slow.

The bipartisan nature of the Bituminous Coal Labor Board, which is composed of one representative of the operators, one of the miners, and an impartial chairman, is open to the criticism that its decisions will, in all likelihood, tend to be compromises rather than straightforward judgments on the merits of the cases. It seems that decisions more in accord with judicial procedure would be rendered by a nonpartisan board composed entirely of persons selected on the basis of competence and impartiality.

The difficulties facing the National Bituminous Coal Commission in administering the price-fixing features of the Act are appalling. Regulatory schemes which are designed to replace the automatic market determination of prices raise many complex problems. Market influences which affect price are many, varied, and subject to constant change, and all these influences must be weighed by the regulatory group. Even under the best of circumstances, the Commission and its administrative agencies will make many mistakes, and smoothness of operation is not likely to be achieved early, if ever.

The Guffey-Snyder Coal Act and the earlier Code of Fair Competition represent the type of Federal regulation which at the present time receives sufficient support to be passed by Congress. The preceding discussion has dealt entirely with the probable stabilizing effects on the coal industry of the various provisions contained in the Guffey-Snyder Coal Act. In this respect the criticisms have been mainly adverse, the chief criticisms being that price control alone does not bring stability to an industry nor does it remedy the results of instability in the past. From the point of view of those outside the industry further criticisms may be leveled at the provisions of the Act. The attempt to make consumers pay for the mistakes of the coal industry and to guarantee coal operators profits may well be resented by consumers who have to pay for their own mistakes and take their chances for profits under a system of unrestricted competition. On the other hand, passage of this Act certainly constitutes evidence of a national need. It demonstrates that operators, miners, and the Govern-

ment alike are willing to try measures widely at variance with past practice and tradition.⁵⁵

(d) *Other Proposals for Federal Regulation*

What other proposals for Federal action to remedy the ills of the bituminous coal industry deserve attention? First, there is the proposal that the Federal Government buy up marginal coal mines and retire them from production. Such a provision was embodied in the Guffey-Snyder Coal Bill but failed of passage. These proposals raise complex questions concerning the probable economic effects of their provisions and concerning the likelihood of effective and honest administration, questions which cannot be explored here. As a general principle, however, it may be said that the costs of public purchase of surplus capacity should be borne by those benefiting from the policy. Otherwise, the proposal smacks of another scheme to make the public pay for over-investment in coal mining, i.e., of another scheme for "socializing losses."

A second proposal is to limit the opening of new mines by requiring a certificate of necessity and public convenience. This proposal is embodied in a recommendation of the United States Coal Commission in 1923, in which it proposed that such a certificate should be secured from the Interstate Commerce Commission before railroads were permitted to construct connections for new mines. It seems not only in the interest of the coal industry but also in the interest of the general public to place some restriction on the unlimited development of the nation's coal resources, when such unlimited development leads to substantial and permanent loss of coal.

Nationalization

Nationalization of the coal industry is proposed in some quarters, and no doubt unified ownership can solve some problems which scattered ownership cannot. Such piecemeal socialization, however, has obvious difficulties to face. Demands of politically articulate consumers of coal for favoritism in the

⁵⁵ It will be made clear, in Chapter 12, that adverse criticisms here leveled at the Guffey-Snyder Coal Act do not represent disapproval of the use of the power of the Federal Government in regulation of the bituminous coal industry. Indeed, Federal regulation is considered the one practicable approach.

distribution of, and in the prices charged for, coal would work havoc with any well-thought-out plan for rehabilitation of the coal industry. Likewise, politically articulate and well-organized miners might be in position to demand preferential treatment too costly for consumers to bear. With control unified, even though subject to political machination, some of the ills of the industry would no doubt disappear; but the danger that the coal industry would be used to subsidize favored groups is so great that serious consideration of nationalization as a solution is at present scarcely discernible. There can be little doubt, however, that, if some degree of stability is not attained by the coal industry, a growing demand for nationalization will develop. Chaos in a basic industry cannot be tolerated indefinitely.

Collective ownership and operation of all means of production is the program of the "left-wing" radicals. Such collective ownership and operation might not be subject to many of the forms of corruption to which the nationalization of a single industry is exposed. Successful collectivization, however, would depend on a complete change in the psychology, ideals, and *mores* of the public, and the unlikelihood that such a change will take place in the near future disposes of collectivization as an immediate method of working out a solution for the bituminous coal industry. The burden of attempting an immediate solution within the present capitalistic economy challenges the nation.

* * * * *

What, then, can be done to remedy the ills of the coal industry, which, although operating within a capitalistic economy, is far removed from the laissez-faire competition envisaged by the classical economists of the 18th and 19th centuries. Their dictum that each man acting in his own selfish interest makes for the greatest common good has apparently lost some of its following, if the present clamor about the coal industry is to be regarded as more than "much ado about nothing." In the concluding chapter, the broad outlines of what seems essential in a national policy for the bituminous coal industry will be sketched.

CHAPTER 12

Essentials of a National Policy for the Bituminous Coal Industry

General Objectives

The general objectives for a national policy directed toward solving the problems of bituminous coal have already been stated, but they may well be repeated here. They are:

1. The provision of coal at as low a cost as is consistent with
2. A decent livelihood for those engaged in the industry and with
3. Rational conservation of coal

In terms of these objectives, an attempt is made in the following paragraphs to formulate recommendations looking toward the solution of the grosser ills of the bituminous coal industry. No effort is made to relate these proposals to the present constitutional powers of the Federal Government. The powers of the Federal Government are derived from its citizens and are subject to change by their will. The question to be discussed here is what are the desirable policies to be pursued with respect to the coal industry.

Socially desirable policies must be directed toward increasing the efficiency of the whole national economy. Measures designed specifically to benefit one district at the expense of another cannot be considered. But it would be foolish to suppose that a policy aimed at increasing the efficiency of the national economy would not adversely affect some coal-producing areas. The location of mines and the location of industries have been determined to some extent by socially uneconomic forces. In addition, industries once well located in relation to sources of raw materials and consuming markets have lost their economic advantages. It is impossible, however, without incurring severe costs, to re-locate industrial enterprises that have lost the economic advantages of location. Some of these costs are incurred directly by the business enterprise, and others, like the cost of unemployment, are borne by workers who lose their jobs or by society in general. Even those costs which, in terms of the best principles of business

accounting, are borne by the industry represent very largely social losses. Idle plants, for example, represent wasted human effort. Therefore, the most economical social use of the productive forces of the nation requires consideration of the present investment of capital and the present disposition of labor forces, as well as of the most efficient methods and the most feasible location of industry.

To assure a reasonable degree of efficiency in the mining of coal, keen competition must be maintained. This competition should be directed toward producing coal at as low a cost as possible by the improvement of mining techniques. It should not be based either on the wasteful exploitation of the national coal reserves or on the ability to reduce workers to, or to hold them at, a low standard of living. In order that coal may be secured at as low a cost as is socially desirable, progressive operators who increase efficiency by use of better techniques or by the introduction of labor-saving machines should be rewarded. In order that they may be rewarded for efficiency, they must be protected from the type of competition which depends on exploitation of labor and coal resources. These ends are best served not by the fixing of prices but by the elimination of undesirable forms of competition.

Control of Capacity

With vast resources of coal, a large potential over-capacity is forever threatening the industry. Because of a temporary expansion of business or for other reasons this potential over-capacity becomes from time to time actual over-capacity. Some control of coal reserves is needed to secure rational conservation of coal resources and to eliminate the demoralizing competition of the vast amount of undeveloped coal land. The Federal Government should, therefore, require a showing of public necessity and convenience before permitting the development of new capacity. If sufficiently stringent restrictions are placed on increasing capacity, the present over-capacity will in time disappear. More immediate reduction of mining capacity involves buying out existing producers, a costly process. Whether the retirement of mining capacity should be at public expense or at the expense of the industry is a difficult

question to answer. To determine the answer, it is necessary to balance the gains to the general public against the losses. In general, it seems that the beneficial social results can be obtained in other ways and that there is no particular reason, except the rescuing of distressed operators and their unfortunate creditors, to justify the tying up of public funds in idle coal properties.

Reduction of Waste

Conservation of the national supply of coal requires not only that the opening up of new mines be restricted but also that existing mines be compelled to operate with a minimum loss of coal. There should be some Federal supervision of mining operations to protect the public interest in the coal supply. Operators who attempt to secure as much of the coal as can with reasonable effort be mined are subject to somewhat higher operating cost than those who employ wasteful methods. The future national welfare calls for restrictions on wasteful methods of producing coal, and Government protection should be provided for operators who seek to conserve the coal supply.

Control of Cutthroat Wage Competition

If the national welfare, present and future, is to be considered paramount, adoption of an additional policy is essential. Are the heavy losses sustained by business and the local community because of shifts of industry away from one district balanced by business and social gains in the district to which industry shifts, if the only motivating reason for the shifts is the ability to secure labor at lower wage rates? All industry is more or less subject to changes in location resulting from the desire to take advantage of lower wage scales, and it is in part through this process that undeveloped areas are enabled to gain their initial momentum. In an industry, however, in which a major national objective is conservation of a vitally important natural resource which cannot be replaced, it appears that shifts induced by differences in wage scales are uneconomic and antisocial. In general, it seems that some control of wage differentials is desirable, since the

competitive system has failed to adjust automatically the labor supply over the country to the work opportunities available. The intention here is not to elaborate the various means by which a reduction in wage differentials might be secured but to point out the need for a national policy directed toward such a reduction.

Adjustment of the Freight-Rate Structure

In the economics of coal, production and transportation are closely allied. Without railroads, coal mines would have been limited largely to the banks of navigable rivers. In discussion of the ills of the coal industry, the finger of guilt is often pointed at the railroads. No doubt over-expansion of railroad facilities led to the opening of coal lands before they were needed. Freight rates also were adjusted to allow more remote coal mines to enter markets. These rates were, in all probability, responsible for some of the shift from old areas to new. With changing location of markets and with changes in the price level, the freight-rate structure remains an important factor holding the power of life or death over coal-producing districts. What use should be made of freight rates to adjust production among districts?

The United States Coal Commission recommended in 1923 that the freight rates on long and short hauls of coal should be so adjusted as to bear a closer relation to the cost of transportation. If this adjustment were made, a gradual shift of production to the areas with the shorter hauls would be expected, since the longer hauls have been favored with a much lower rate per ton-mile. Such a course is a desirable thing, since it results in more economical transportation. Care must be taken, however, that the change is not too rapid, for hasty change might cause more distress in the hitherto favored areas than would be balanced by gains resulting from the lowering of transportation costs. In general, so far as the transportation of coal is concerned, the power of the Interstate Commerce Commission should be used to deal with freight rates so as to guard against uneconomic changes in coal production and distribution.

Social Sharing of the Cost of Instability

It is neither economically feasible nor socially desirable that all shifts in production of coal be eliminated. Growth of new industries and perfection of better techniques in the use of coal result in shifts in the location of industries demanding coal or in shifts in the type of coal demanded. Social progress demands that such changes be encouraged, but, since the social gains are matched to some extent by the losses sustained by individuals through lack of employment, it is no more than just that these losses be shared by society. Some measure of sharing can be secured through universal unemployment insurance. Reduction of the loss can be obtained by facilitating the transfer of displaced workers to other employments.

Fluctuating demand for coal also causes much hardship and results in short working time and uneconomic use of mining and transportation equipment. Fluctuations in demand arise out of seasonal and cyclical changes in business activity and out of changes in weather conditions. Since these causes are not within the power of the coal industry to control, the loss sustained thereby should be borne by society as a part of the price of coal.

The broad policies recommended here have looked forward to control through the Federal Government of those factors causing distress in the coal industry. To this point no particular thought has been given to remedying the present ills of the industry. The whole emphasis has been on preventing the recurrence of the present situation. What measures can be taken to remedy the present condition of the coal industry and to prevent its becoming a canker on the whole social system? To a large extent, no doubt, natural forces will lend a healing hand if those demoralizing competitive factors causing distress are removed, but immediate relief is nevertheless needed. The present surplus of miners should be supported from the public treasury for the time being, trained in economically useful tasks, and transferred to other employment—such employment to be created by public agencies if necessary.

Relief for capital as seen from the point of view of this study does not consist of assuming existing over-investment as a social burden; but it does consist of removing the threat of future over-capacity, by limiting increases in capacity, and of eliminating competition in wage standards. Competition in efficiency must remain if any remnant of the competitive system is to be maintained.

Regulation of Competing Sources of Energy

Although bituminous coal is nationally the predominant source of heat and power, competing sources of energy are important factors in terms of the national requirements and especially important in some regions. The major sources of energy directly competitive with bituminous coal are anthracite coal, petroleum, natural gas, and water power. Any policy with respect to bituminous coal is likely to affect its competitive position in relation to these other sources of energy. It is difficult in the long run, therefore, to envisage a national bituminous coal policy without also a national policy directed toward these other energy producers. A national bituminous coal policy is almost certain to become in time a part of a national fuel and power policy, probably much as the national railroad policy is now developing into a much broader national transportation policy.

Relationship to Industry in General

Whatever policy is adopted regarding the bituminous coal industry, if it accomplishes anything toward eliminating causes of instability, will undoubtedly strongly affect other industries. The price of coal is likely to be affected in some manner by a national coal policy. Through the price of coal, many industries will be touched. The results of a national coal policy will no doubt be found to extend into many unexpected corners. In some regions the effects may be very pronounced. It is impossible to foresee all the many ramifications of any measure which might be adopted. A national coal policy must, therefore, be flexible and subject to adjustment to the changing requirements of the entire national economy.

Some degree of national planning is implicit in a national coal policy. The coal industry cannot be taken from its setting in the national picture and treated separately from all other industry. Since an effective national policy for the coal industry will affect other industry, gains secured through a coal policy will at times have to be weighed against losses of advantage in some industries and in some regions. An intelligent coal policy, therefore, is impossible except as its elements are based on at least the rudiments of a national economic plan.

* * * * *

The function of this discussion has been, therefore, not to lay down hard and fast rules for the conduct of the bituminous coal industry but rather to outline those broad, general policies which in the light of past experience and of the present industrial system appear likely to accomplish most in terms of stability and efficiency in the bituminous coal industry without too greatly affecting other industries.

APPENDICES

APPENDIX A

Miscellaneous Exhibits

Exhibit A

BITUMINOUS COAL RESOURCES IN PENNSYLVANIA
BY COUNTIES
(Thousands of Net Tons)

County	Original Deposit	Mined Out or Lost to and Including 1926	Recoverable End of 1926
Allegheny.....	3,194,820	969,200	1,498,948
Armstrong.....	3,750,700	107,290	2,491,100
Beaver.....	1,261,797	7,650	651,517
Blair.....	78,516	23,900	36,508
Bradford.....	44,440	14,500	15,514
Broad Top Field ^a	414,954	41,850	252,918
Butler.....	4,154,807	39,300	2,257,511
Cambria.....	5,385,000	466,900	3,638,080
Cameron.....	61,560	235	33,561
Centre.....	514,485	75,250	275,076
Clarion.....	2,042,800	60,000	1,262,300
Clearfield.....	3,992,000	308,210	2,165,400
Clinton.....	114,380	17,221	54,580
Elk.....	559,781	54,775	300,473
Fayette.....	5,229,734	899,544	2,604,400
Greene.....	9,464,215	42,390	6,276,251
Indiana.....	6,339,400	299,200	4,288,700
Jefferson.....	3,334,900	279,400	2,123,400
Lawrence.....	1,007,866	16,445	484,020
Lycoming.....	72,000	7,000	40,000
Mercer.....	499,680	80,000	224,540
McKean.....	422,865	1,615	226,303
Somerset.....	6,091,800	187,384	3,986,900
Tioga.....	155,432	48,000	55,660
Washington.....	10,526,023	557,763	5,481,680
Westmoreland.....	6,381,504	1,218,141	3,297,500
Total.....	75,093,459	5,823,163	44,022,840

Source: Pennsylvania Geological Survey, Fourth Series, Bulletin M6, 1928, *Bituminous Coal Fields of Pennsylvania*, Part III, p. 7.

^a Consists of a small area centering at the juncture of Huntingdon, Bedford, and Fulton counties.

Exhibit B
BITUMINOUS COAL FIELDS INCLUDED IN EACH
ORIGINATING AREA

(The areas described are those used in connection with the data compiled by the Ohio Bureau of Coal Statistics)

1. Western Pennsylvania district includes the Butler-Mercer, Freeport, Reynoldsville (1934 only), Pittsburgh, and Connellsville fields. The tonnage for Reynoldsville was very small and does not appreciably affect the comparability of the data for 1934 with those for prior years.
2. Central Pennsylvania-Meyersdale district includes the Altoona, Clearfield (1934), and Meyersdale fields. The tonnage for Clearfield was negligible—less than 1,000 tons were shipped in 1934 to the combined westward destinations.
3. Cumberland-Piedmont district includes only the Cumberland-Piedmont field.
4. Northern West Virginia district includes the Fairmont, Moundsville, Elk River (1933 and 1934 only), and Junior (1933 and 1934 only) fields. Shipments from the Elk River and Junior fields were of minor importance and have little effect on the comparability of 1933-1934 data with 1919-1932 data.
5. Ohio district includes the Massillon, Leetonia, Deerfield, Middle, Ohio No. 8, Cambridge, Crooksville, Hocking, Shawnee, Pomeroy, and Jackson fields.
6. Eastern Kentucky district includes the northeastern Kentucky, Big Sandy, Hazard, Harlan, and McRoberts fields.

7. Southern West Virginia district includes the Kenova, Thacker, Gauley, Kanawha, New River, Virginian (1925-1934 only), Tug River, and Pocahontas fields. Although the tonnage for the Virginian field increased rapidly after the reporting service for the field began, it was probably small in the previous years.
8. Tennessee district includes the South Jellico and Oakdale fields.
9. Virginia district includes the Clinch Valley, Stonega, and Virginia (1931-1934 only) fields. Although the tonnage for the Virginia field increased rapidly after the reporting service for the field began, it was probably small in the previous years.

Exhibit C
BITUMINOUS COAL SHIPPED TO ATLANTIC PORTS, BY
ORIGIN AND BY DESTINATION OR USE
1917 AND 1918
(Thousands of Net Tons)

Year and Destination or Use	Originating District						
	Central Penn- sylvania	Western Penn- sylvania ^a	Somerset and Cumber- land- Piedmont	Fair- mont, West Virginia	Southern West Virginia ^b	Other Fields ^c	All Fields
1917							
Shipped as cargo to:							
Pennsylvania.....	739	179	300	259	0	0	1,477
New York.....	3,592	432	764	551	436	20	5,795
New Jersey.....	594	0	116	71	300	13	1,095
New England.....	894	1,134	1,036	1,247	7,537	421	12,268
Maryland.....	133	115	632	32	744	4	1,656
Delaware.....	60	20	44	40	0	0	164
Florida.....	0	0	0	0	65	0	65
Unspecified.....	1	0	0	0	0	0	1
Total.....	6,013	1,880	2,891	2,200	9,083	454	22,520
Coastwise Bunker.....	900	169	926	279	1,001	23	3,299
Foreign Trade							
Cargo.....	235	331	136	155	4,634	52	5,543
Bunker.....	2,402	95	1,174	66	2,168	141	6,045
Grand Total.....	9,550	2,476	5,128	2,699	16,885	670	37,408
1918							
Shipped as cargo to:							
Pennsylvania.....	720	111	236	300	0	0	1,367
New York.....	4,146	871	2,378	382	139	2	7,918
New Jersey.....	618	0	126	83	0	0	827
New England.....	1,600	1,210	1,195	2,578	8,673	394	15,651
Maryland.....	120	91	330	96	1,004	7	1,649
Delaware.....	23	0	19	0	0	0	42
Florida.....	3	0	14	0	79	11	108
Virginia and South Carolina	0	0	0	0	340	20	361
Total.....	7,231	2,281	4,299	3,439	10,237	435	27,922
Coastwise Bunker.....	1,791	103	1,249	174	3,403	21	6,742
Foreign Trade							
Cargo.....	57	19	44	112	3,558	70	3,859
Bunker.....	2,489	45	574	17	1,306	67	4,498
Grand Total.....	11,566	2,448	6,167	3,742	18,504	594	43,021

Source: *Mineral Resources of the United States* (Part II), 1917, p. 1209; and 1918, p. 1320. Totals are based on exact figures, not on rounded numbers.

^a Includes the Pittsburgh, Greensburg, Westmoreland, Latrobe, Ligonier, Connelleville, northern Pennsylvania, and Panhandle of West Virginia fields.

^b Includes the Pocahontas, Tug River, Thacker, Kenova, New River, and Kanawha fields.

^c Includes the Ohio Number 8, southwestern Virginia, southeastern Kentucky, Tennessee, and Clinch Valley fields.

^d Less than 500 tons.

APPENDIX B

Interstate Shipments of Bituminous Coal

Bituminous coal entering interstate commerce has constituted, in the past two decades, an increasing part of the total bituminous coal output among the most important eastern states. The four states, Pennsylvania, West Virginia, Ohio, and Kentucky, account for approximately two-thirds of the total bituminous coal produced in the United States. In 1915, production in the four states amounted to nearly 279,000,000 tons, of which 145,000,000 tons, or almost 52 per cent, was shipped out of the states of origin and therefore became interstate commerce. Another 54,000,000 tons—a little less than 20 per cent, the bulk of which was used for fuel by the railroads—became partially interstate (or international) commerce. The remaining 80,000,000 tons, amounting to less than 29 per cent of the total, was consumed in the respective states in which it was produced. In 1929, almost 61 per cent of the total production in the four-state area was wholly interstate commerce, and another 18 per cent was at least partially interstate tonnage. The remaining tonnage—only 21 per cent of the total—was used within the states in which it was mined. In other words, the proportion of bituminous coal used locally in the four largest soft coal mining states declined appreciably both on a percentage basis and in actual tonnage from 1915 to 1929.

The change in the percentage of coal entering interstate shipments between 1915 and 1929 in the four states, however, is by no means uniform. In Pennsylvania and West Virginia the proportion of wholly interstate shipments was almost the same in 1929 as in 1915, whereas the proportion in Ohio and in Kentucky increased decidedly. Interstate shipments accounted for 41.6 per cent of total production in Pennsylvania in 1915 and for 41.4 per cent in 1929; in West Virginia the percentages were 79.9 and 79.4, respectively. Interstate shipments from Ohio rose from 21.7 per cent in 1915 to 26.2 per cent in 1929, and in Kentucky out-of-state tonnage increased from 57.5 per cent in 1915 to 79.5 per cent in 1929. The pro-

portion of partially interstate shipments was about the same in 1929 as in 1915 in Pennsylvania; in West Virginia, the proportion increased somewhat. On the other hand, the proportion of partially interstate tonnage in Ohio and in Kentucky declined substantially from 1915 to 1929. The larger part of the coal designated as "partially interstate commerce" represents railway fuel. Since most of the railroads are interstate carriers, they are subject to regulation by the Federal Government; consequently, a large part—probably the larger part—of the proportion labeled "partially interstate commerce" either moves in interstate commerce or is used as fuel by interstate carriers subject to Federal regulation.

Ohio depends to a larger extent on intrastate markets than any of the other three states. In 1929, 43 per cent of the coal produced in Ohio was sold locally, whereas only 4.8 per cent of the total output in West Virginia and 8.3 per cent of the production in Kentucky was used within the state borders. In 1915, 7.8 per cent of the output in West Virginia and 20.7 per cent in Kentucky moved to local markets. In Pennsylvania about 38 per cent of the tonnage moved to local markets both in 1929 and in 1915.

Only fragmentary data with respect to interstate shipments of coal from the four states are available for the years since 1929; but the data which are available indicate that there have been significant changes in trends in the past four or five years. Undoubtedly the most important shift has been the increasing percentage of Pennsylvania coal leaving the state. In 1929, combined shipments from Pennsylvania to tidewater, to the Great Lakes, and all-rail shipments to western states and Canada comprised 26.3 per cent of the total output of the state; in 1934, tonnage to the same markets was 32.4 per cent of the total production. The largest percentage gain was in shipments to the Great Lakes. The combined all-rail westward shipments and shipments to the lakes from Ohio fell from 37.3 per cent of total production in 1929 to 26.4 per cent in 1934; in West Virginia, from 68.9 per cent to 67.2 per cent. There was a slight gain in the proportion of these shipments from Kentucky between 1929 and 1934.

Exhibit D

**INTERSTATE COMMERCE IN BITUMINOUS COAL PRODUCED IN
PENNSYLVANIA AND IN THREE MAJOR COMPETITIVE STATES
1915 AND 1929**

Year and Producing State	Thousands of Net Tons			
	Wholly Interstate ^a	Partially Interstate ^a (Extent Unknown)	Wholly Intrastate ^a	Total
1915				
Pennsylvania.....	65,666	32,295	59,994	157,955
Ohio.....	4,875	7,896	9,664	22,435
West Virginia.....	61,706	9,478	6,000	77,184
Kentucky.....	12,283	4,650	4,429	21,362
Total.....	144,530	54,319	80,087	278,936
1929				
Pennsylvania.....	59,670	29,548	55,038	144,256
Ohio.....	6,365	7,457	10,428	24,250
West Virginia.....	113,220	22,524	6,809	142,553
Kentucky.....	39,914	6,151	4,172	50,237
Total.....	219,169	65,680	76,447	361,296
Per Cent of State Total				
1915				
Pennsylvania.....	41.6%	20.4%	38.0%	100.0%
Ohio.....	21.7	35.2	43.1	100.0
West Virginia.....	79.9	12.3	7.8	100.0
Kentucky.....	57.5	21.8	20.7	100.0
Total.....	51.8	19.5	28.7	100.0
1929				
Pennsylvania.....	41.4%	20.5%	38.1%	100.0%
Ohio.....	26.2	30.8	43.0	100.0
West Virginia.....	79.4	15.8	4.8	100.0
Kentucky.....	79.5	12.2	8.3	100.0
Total.....	60.7	18.2	21.1	100.0

Source: *Mineral Resources of the United States, 1915*, Part II, pp. 439 and 507. *Supplement to Monthly Coal Distribution Report*, Numbers 3, 4, and 6, and *Weekly Coal Report*, Number W.C.R. 653 (mimeographed, issued by the United States Bureau of Mines).

^a The data for interstate shipments consist of (1) all-rail and river shipments to "other" states, (2) exports by rail, (3) shipments to the Great Lakes, exclusive of shipments to Pennsylvania and to Ohio by way of Lake Erie, and (4) shipments to tidewater, exclusive of Pennsylvania shipments to Philadelphia tidewater destined for inside capes; those for partially interstate shipments consist of (1) railroad fuel delivered by all-rail routes, (2) for Pennsylvania and Ohio, coal received also by way of Lake Erie, and (3) for Pennsylvania, the addition of total shipments to Philadelphia tidewater destined for inside capes; and those for intrastate shipments consist of (1) consumption at mines for heat and power, (2) coal used for coke making at the mines, (3) sales to local trade, and (4) shipments by rail or river to points within the state.

Pennsylvania received 41,878 tons of coal by way of Lake Erie in 1929 and Ohio received 359,148 tons. Neither state received any coal by this route in 1915. Shipments by way of Philadelphia to nearby inside capes amounted to 1,696,734 tons in 1929, and to 2,000,000 tons (estimated) in 1915. It should be observed that neither the lake receipts nor the tidewater shipments need originate in the consuming state. The extent of interstate commerce, therefore, is slightly understated.

^b Includes the northern part of Tazewell County, Virginia, and a small part of the Thacker district in Kentucky, but excludes the Cumberland-Piedmont district along the northeastern border.

^c Excludes the part of the Thacker district lying in Kentucky.

BIBLIOGRAPHY

- American Iron and Steel Institute, Annual Statistical Report of the (for various years), New York
- Ashley, George H., Bituminous Coal Fields of Pennsylvania, Part I, General Information on Coal, Topographic and Geologic Survey, Bulletin M6, Harrisburg, 1928
- Campbell, M. R., and Bownocker, J. A., The Coal Fields of the United States, United States Geological Survey, Professional Paper 100, Washington, 1929
- Coal Trade, annual issues for the years 1915 to 1921, New York
- Eavenson, Howard N., Southern High-Volatile Coal for Gas and Metallurgical Uses, American Institute of Mining and Metallurgical Engineers, Inc., Technical Publication 489, New York, 1932
- Greater Pennsylvania Council, Harrisburg:
- The Decline of the Bituminous Coal Industry in Pennsylvania, Soft Coal Bulletin No. 1, 1932
 - Freight Rates on Bituminous Coal, Pennsylvania and Other Appalachian Fields, Soft Coal Bulletin No. 2, 1933
- Hamilton, Walton H., and Wright, Helen R., The Case of Bituminous Coal, Institute of Economics, New York, 1926
- Hunt, Edward; Tryon, F. G.; and Willits, Joseph H., What the Coal Commission Found, Baltimore, 1925
- Mansfield, Harvey C., The Lake Cargo Coal Rate Controversy, New York, 1932
- Morris, Homer L., The Plight of the Bituminous Coal Miner, Philadelphia, 1934
- Murphy, Raymond E., The Mineral Industries in Pennsylvania—Trends of the Mineral Producing and Processing Industries, Greater Pennsylvania Council, Harrisburg, 1933
- National Industrial Conference Board, The Competitive Position of Coal in the United States, New York, 1931

- Reese, John F., and Sisler, James D., Bituminous Coal Fields of Pennsylvania, Part III, Coal Resources, Topographic and Geologic Survey, Bulletin M6, Harrisburg, 1928
- Reitell, Charles, Freight Rates on Soft Coal, Pennsylvania Industrial Survey, 1927
- Saward's Annual for the years 1919 to 1934, New York
- United States Coal Commission, Report of the, 1923, Parts I-IV, Washington
- United States Bureau of Labor Statistics:
Hours and Earnings in Anthracite and Bituminous Coal Mining, Bulletins Nos. 316 and 416
Hours and Earnings in Bituminous Coal Mining, Bulletins Nos. 454 and 516
- United States Bureau of Mines:
Distribution of Coal Shipments (mimeographed monthly reports), May, 1932 to September, 1935, and Supplements to Numbers 1, 2, 3, 4, and 6
Mineral Resources of the United States for the years 1915 to 1931 and Minerals Yearbook for the years 1932 to 1935. The sections dealing with coal have been reprinted and issued separately as Coal in 1927, Coal in 1928, and similarly for other years. References have been made to these separate sections in the text of the study.
Stocks, Consumption, and Production of Coal (mimeographed weekly reports), January, 1931 to September, 1935
- United States Bureau of Foreign and Domestic Commerce, Monthly Summary of Foreign Commerce of the United States
- Van Kleeck, Mary, Miners and Management, Russell Sage Foundation, New York, 1934
- Young, William Harvey, Sources of Coal and Types of Stokers and Burners Used by Electric Public Utility Power Plants, Institute of Economics of The Brookings Institution, Washington, 1930

INDEX

- Accidents, prevention, 158
Allegheny County, 17, 22
Allegheny River, 25
Annual Statistical Report of the American Iron and Steel Institute, 10
Anthracite coal, 3, 173
Antitrust laws, 154
Areas, coal-producing, definition, 11
Armstrong County, 17
Ashtabula, 80, 83
- Baltimore harbor
 origin of coal loaded, 95
 vessel fuel loaded, 132
Beehive coke, *see* Coke making
Bituminous Coal Conservation Act of 1935, *see* Guffey-Snyder Coal Act
Bituminous Coal Labor Board, 160, 165
Blast furnaces, coke consumption, 122
Buffalo, 80
Bureau of Mines, 7, 9, 158
Business activity, effect of changes on mining capacity, 162
Butler County, 17
By-product coke, *see* Coke making
- California, 120
Cambria County, 17, 22
Campbell, M. R., 15, 17
Canada
 exports to, 103
 receipts by lake, 85
Capacity, productive
 control, 161, 162, 169
 effect of minimum prices, 161
 growth in non-union, 151
 reduction of, through failures, 154, 161
Capital investment, 150, 169
Captive mines, 154
Car-ferry, *see* Rail shipments
- Car shortage, 146, 151
Centralization of ownership, 154
Central Pennsylvania district
 coal from, to
 Canada, 43
 Great Lakes, 42, 80
 New England, 54
 New Jersey, 52
 New York, 50
 Pennsylvania points, 40, 48
 public utilities, 133
 railroads for fuel, 42, 127
 tidewater, 43
 coal used by mines, 36
 included in Pennsylvania area, 11
 main market for rail shipments outside Pennsylvania, 41
Certificate of necessity and convenience, 166, 169
Charleston harbor
 origin of coal loaded, 95
 vessel fuel loaded, 132
Chicago district, 62
Clarion County, 17
Clearfield County, 17
Clearfield district, 90, 102
Cleveland port, 80, 83
Coal Commission, National Bituminous, *see* National Bituminous Coal Commission
Coal Commission, United States, *see* United States Coal Commission
Coal Control Association of Western Pennsylvania, 10
Coal Trade, 10
Coastwise traffic, 94, 101
Code of Fair Competition, 5, 70, 159, 161
Coke consumption
 by blast furnaces, 120
 by foundries, 122

- Coke consumption (Continued)
 for domestic heating, 122
 in Pennsylvania, 120
 per ton of pig iron, 123
- Coke from Pennsylvania, distribution, 120
- Coke making
 beehive, decline, 27, 39, 116-120
 by-product, gain, 27, 39, 116-120
 coal used, 4, 116-127
 in Connellsville district, 117
 in Ohio, 60
 in Pennsylvania, 39, 116
 shifts in, 27, 113, 120
 yield in, 120
- Collective bargaining, 160, 162
- Collectivization, 167
- Colorado, 17
- Colorado and New Mexico Coal Association, 9
- Compensation
 for injuries, 153, 156
 variation of state laws, 157
- Competing sources of energy
 check on high coal prices, 155
 importance, 3, 4, 145
 lack of regulation, 154
 regulation proposed, 173
 uneven effect, 21
see also Anthracite coal, Gas, Oil, Water power
- Competition
 among transportation agencies, 145, 171
 effect of over-capacity, 145
 in wage scales, 170
 keenness of, 3
 maintenance of, 169, 173
 results of, 5
 unfair methods, 159, 160
- Competitive fuels, *see* Competing sources of energy
- Competitive position of coal fields, maintenance of, 163, 164, 168
- Conneaut port, 80, 83
- Connellsville district, 117
- Conservation of coal resources, *see* Resources
- Consumers of bituminous coal
 counsel for, 160
 fight for rate changes, 146
 importance of major groups, 111, 113
 political pressure of, 166
 price resistance, 5
- Consumption of bituminous coal
 coal mines, 115
 in Pennsylvania, 34
 coke industry, 113, 116-127
 in Pennsylvania, 27, 39, 116-127
 domestic users, 115, 116
 Illinois-Indiana, 62
 increased efficiency of, 4
 intrastate, 181, 182
 manufacturing plants, 113-115
 Michigan, 60
 New England, 54
 New Jersey, 52
 New York, 50
 northeastern states, 109
 Ohio, 56
 Pennsylvania, 48
 public utilities, 132-135
 railroads, 127, 128
 summary of changes, 109, 138-140
 vessels, 128-132
- Control
 by Federal Government, 168-174
 monopolistic, 3, 154
 of capacity, 161, 162, 169
 of freight rates, 171
 of mining methods, 170
 of prices, 165
 of wage competition, 170, 171
 through public ownership, 166
- Costs of production
 attempts to reduce, 146
 differences, 162, 163
see also Relocation of industry, Social costs, Unemployment
- County production in Pennsylvania, 21-24
- County resources in Pennsylvania, 17-19
- Cumberland-Piedmont district, 90
see also Somerset-Meyersdale and Cumberland-Piedmont districts

- Decentralized ownership, 145
- Demand for bituminous coal
 shifts in, 3
 causes of variation, 145
see also Consumption
- Distribution of bituminous coal
 channels of, 25-30
 cost of local, 151
 from Pennsylvania mines to
 coke producers, 60, 124
 foreign markets, 43, 103-108
 Great Lakes, 42, 71-74
 Illinois-Indiana, 65
 Michigan, 60
 New England, 40, 54
 New Jersey, 52
 New York, 40, 50
 Ohio, 40, 56
 Pennsylvania points, 39, 48
 public utilities, 133
 railroads for fuel, 41, 127
 tidewater, 43, 88-102
 vessels for fuel, 131
 interstate, 40, 181-183
 limitations of data, 9
- Distribution of Coal Shipments, 7*
- Districts, coal-producing, grouping of, 11
- Domestic heating, 115, 116
- Eastern Kentucky-Tennessee area
 definition, 11
 shipments from, to
 Great Lakes, 72
 Illinois-Indiana, 64
 Michigan, 61
 Ohio, 58
 tidewater, 90
- Efficiency
 competition in, 173
 in production, effect on prices, 163
 in use of coal, 4, 114, 115, 117
- Election of employe representatives, 160
- Electricity
 coal used for, 132-135
 use in manufacturing, 114
 use by coal mines, 115
- Employment
 irregularity, 150
 public, 172
 stabilization through monopoly, 155
- Equipment, over-capacity, 150
- Erie port, 80, 83
- Exports of bituminous coal
 destinations, 103
 Great Lakes, 106
 rail routes from Appalachian fields,
 103
 rail routes from Pennsylvania, 43, 103
 tidewater, 92, 101, 106
 to Canada, 103
- Failure of Coal companies, 154, 161
- Fairmont field, 90
- Fairport harbor, 80, 83
- Fayette County, 17, 22
- Federal Government
 limitation of power, 5, 168
 proposed coal policy, 168-174
 purchase of coal lands, 166
 regulation, 157-166, 168-174
 relief, 156, 172
 supervision of mining, 170
- Foreign trade in bituminous coal, *see*
 Exports, Imports
- Foundries, coke consumption, 122
- Freight rates
 attempts to get adjustment, 5, 146
 differentials in
 adjustment of, 77, 164, 171
 on shipments to Great Lakes, 77, 84
 on shipments to Michigan, 62
 on shipments to tidewater, 102
 difficulty of adjustment, 145
 influence on price, 151
 influence on rail shipments, 41
 intrastate, in Ohio, 70, 156
 recommendation by Coal Commission
 in 1923, 164, 171
 regulation of, 158, 171
 under Guffey-Snyder Act, 164
- Fuel and power policy, national, 173
- Fuels, competitive, *see* Competing
 sources of energy

- Gardening projects, 155
- Gas
 coal used for, 113
 use in Pennsylvania, 116
 use in southwest, 133
see also Competing sources of energy
- Georgia, 11
- Great Lakes, *see* Lake —
- Greene County, 17, 22
- Greensburg field, 90
- Guffey-Snyder Coal Act, 5, 159-165
- Hampton Roads harbor
 origin of coal loaded, 53, 95, 99
 shipments from, to
 foreign markets, 101
 New England, 55
 New Jersey, 53
 Pennsylvania, 49
 trend of shipments, 96, 101
 vessel fuel loaded, 132
- Handicraft industries, 156
- Harlan-Benham district, 11
- Hazard district, 11
- High-volatile fields, 90
- Hours of work, 160, 164
- Houses, company, 160
- Huron (Ohio) port, 80, 83
- Illinois
 coal deposits, 17
 coal from, for railroad fuel, 128
see also Illinois-Indiana
- Illinois Freight Association, 9
- Illinois-Indiana fields, shipments to
 Illinois-Indiana area, 64
 Michigan, 60
- Illinois-Indiana market
 coal shipments to, from
 eastern Kentucky-Tennessee area, 64
 Illinois-Indiana fields, 64
 Pennsylvania, 65
 southern West Virginia, 64
 coke from Pennsylvania, 120
 coking coal, 65
 consumption, 62
 freight rates on coal to, 143
- Illinois-Indiana market (Continued)
 lake receipts, 65, 87
- Imports, 108
- Indiana, *see* Illinois-Indiana
- Indiana County, 17, 22
- Industrial consumers, ownership of
 mines, 154
- Instability
 causes, 1, 145
 elimination, 163
 social-sharing of cost, 172
- Institute of Economics, 133
- Interstate commerce in coal, 157, 181
- Interstate Commerce Commission, 5,
 156, 158, 164, 166, 171
- Intrastate freight rates in Ohio, 156
- Investment
 economical use, 169
 over-, 150
- Iowa, 87
- Iron ore, *see* Ore
- Jacksonville agreement, 61, 76, 150
- Jefferson County, 17
- Kanawha district, 11, 84, 90, 99
- Kenova district, 90
- Kenova-Thacker district, 11, 99
- Kentucky, eastern, 90
 coal from, used for coke, 139
 lake ports loading coal from, 80
 quality of coal deposits, 17
 railroad fuel from, 128
 shipments to central consuming area,
 68
 tidewater loadings at Hampton Roads,
 95, 99
 vessel fuel from, 132
see also Eastern Kentucky-Tennessee
 area
- Labor Board, Bituminous Coal, 160, 165
- Lake Erie ports
 coal loadings, 80
 iron ore to inland furnaces, 81
- Lake Huron, 86
- Lake Michigan, 86

- Lake Ontario, 85
- Lake shipments of coal
 exports, 106
 for railroad fuel, 87, 128
 for vessel fuel, 87
 from Pennsylvania, 29, 41, 42, 71
 origin, 71-74
 ports loading, 80
 railroad freight rates, 77, 84
 suspended in winter, 43
 to various markets, 52, 57, 62, 65, 84-87, 106
 trend, 71, 72
- Lake Superior ports
 ore shipments, 84
 receipts of coal, 84, 85
- Local trade in Pennsylvania, 28, 38
 location, mines and industry, 168
- Long hauls, 171
- Lorain, 80, 83
- Low-volatile fields, 90
- Maher Coal Bureau, 9
- Manufacturing, consumption of coal, 113-115
- Market channels for coal
 changes in, summary, 29, 137
 classification, 25-30
 disruption by World War, 9
- Market for bituminous coal from Pennsylvania
 changes in, summary, 65-70, 140-143
 classification, 6
 export, 43, 103, 105
 Great Lakes, 42, 71
 main area, 31
 Michigan, 60
 New England, 40, 54
 New Jersey, 40, 52
 New York, 40, 50
 Ohio, 40, 56
 Pennsylvania, 34-40, 48
 railroad, 41, 127
 tidewater, 43, 92-94
- Markets for coke, 120-123
- Maryland
 coal fields included in Pennsylvania area, 11
 coal used in coke industry, 124
 exports in 1915, 105
 quality of coal deposits, 17
 tidewater ports loading coal from, 95
 tidewater receipts, 94
- Massachusetts, 124
- Mechanization, 146, 169
- Mining methods, control of, 170
- Meyersdale, 90
see also Somerset-Meyersdale
- Michigan
 consumption, 60
 freight rates to, 62
 production, 60
 sources of receipts, 60-62, 85, 87
- Mineral Resources of the United States*, 7
- Miners
 decent livelihood, objective, 168
 exploitation, 169
 lost time, 150
 possible political pressure, 167
 rehabilitation, 155, 156, 163, 164
 relief for unemployed, 152, 172
 representatives, election of, 160
 surplus, 150, 154, 163, 164
 transfer to other employment, 172
 unemployment, 5, 172
see also Unionism, Unionization, Unions
- Mines, use of coal by, 28, 34, 115
see also Coke making, beehive
- Minnesota, 87
- Monongahela River, 25, 26
- Monopolistic control
 disadvantage to labor, 155
 lack of, 3, 154
- Montana, 17, 120
- Monthly Coal Distribution Report*, 7
- Monthly Summary of Foreign Commerce of the United States*, 10
- National Bituminous Coal Commission, 159, 160, 163-165

- National Coal Association, 38
- National Industrial Recovery Act, 159
- Nationalization, 166
- National coal policy
 competing sources of energy, 173
 effects on other industries, 173
 essentials, 168-174
 general objectives, 168
 national economic plan, 174
- National planning, 174
- Nebraska, 87
- Necessity and convenience, certificate of,
 166, 169
- New England market
 coking coal, 117
 imports, 108
 Pennsylvania coal, 40, 54
 railroad fuel, 128
 tidewater receipts, 55, 94, 101
 vessel fuel, 132
- New Jersey market
 coking coal, 117
 northern West Virginia coal, 53
 Pennsylvania coal, 40, 52
 tidewater receipts, 94
- New Mexico, 17
- New River district, 11, 90, 102
- New York harbor
 origin of coal loaded, 95
 vessel fuel loaded, 132
- New York market
 coke, 120
 coking coal, 124
 lake receipts, 52, 87
 Ohio coal, 51
 Pennsylvania coal, 40, 50
 tidewater receipts, 51, 94
 West Virginia coal, 51
- North Dakota, 17
- Northeastern Kentucky district, 11
- Northern Appalachian fields, *see* Northern fields
- Northern fields
 definition, 11
- Northern Fields (Continued)
 shipments from, to
 central consuming area, 67
 Great Lakes, 71, 73
 tidewater, 90, 96
 unionization in, 76⁴
- Northern West Virginia area
 definition, 11
 shipments from, to
 central consuming area, 68
 New Jersey, 53
 New York, 51
 Ohio, 58
 Pennsylvania, 48
 tidewater, 90
 lake ports loading coal from, 80
 tidewater ports loading coal from, 95
- Non-union fields, 77, 150
- NRA Coal Code, *see* Code of Fair Competition
- Ohio Bureau of Coal Statistics, 9
- Ohio
 definition of area, 11
 intrastate freight rates, 70, 156
 lake ports loading coal from, 80
 production, 136
 shipments from, to
 central consuming area, 68
 foreign markets, 105
 Great Lakes, 71-74
 Michigan, 61
 New York, 51
 Ohio points, 57
 tidewater, 90
 tidewater ports loading coal from, 95
 use of coal from, for
 railroad fuel, 128
 vessel fuel, 132
- Ohio market
 change in shipments to, 56-60
 coke, 120
 coking coal, 124
 consumption, 56
 lake receipts, 57, 87

- Ohio market (Continued)
 shipments to, from
 eastern Kentucky-Tennessee area, 58
 Ohio mines, 57
 Pennsylvania, 40, 56, 58
 northern West Virginia area, 58
 southern West Virginia area, 58
 Ohio River, 25
 Oil, 3, 132, 173
 see also Competing sources of energy
 Operators, fight for rate changes, 146
 Ore and Coal Exchange, 9
 Ore, iron
 return loads, by ports, 81-83
 shipments from Lake Superior ports,
 84
 Organization of labor, *see* Unions
 Over-capacity
 cause of instability, 145, 150
 prevention, 169
 reduction through failures, 154
 retirement, 161, 162
 War-time development, 4
 Ownership
 centralization, 154
 decentralized, 145
 Pennsylvania
 coal deposits, 15
 coal used for coking, 127
 coke shipments to other states, 120
 loss in coke making, 117
 production, 2, 19
 see also Consumption, Distribution
 Pennsylvania area
 definition, 11
 see also Consumption, Distribution
 Pennsylvania Geological Survey, 9, 15
 Pennsylvania market, 34-40
 coal consumption in
 coke making, 39, 114
 manufacturing, 114, 115
 mines and quarries, 7, 115
 public utilities, 133
 coke, 120
 importance, 34
 lake receipts, 87
 Pennsylvania market (Continued)
 loss to other areas, 50
 source of coal, 48-50
 tidewater receipts, 49, 94
 Petroleum, *see* Oil
 Philadelphia harbor
 origin of coal loaded, 95
 vessel fuel, 132
 Pittsburgh district
 freight rate from, 62, 84
 tidewater shipments from, 90
 Pittsburgh seam, 116
 Planning, national, 174
 Pocahontas district, 11, 90, 100, 102
 Port Huron (Michigan), 85
 Ports, tidewater, *see* Tidewater ship-
 ments
 Price
 and coal policy, 157, 172, 173
 delivered
 influence of freight rates, 151
 small effect of price-cutting, 151
 maximum, 160
 mine, 146, 150
 minimum
 effect on capacity, 161, 162
 fixing of, 160
 under Code, 159
 Price-cutting, 150
 Price-fixing
 control, 165
 difficulties of administration, 165
 stabilizing effect, 163
 Producers, *see* Operators
 Production of bituminous coal
 importance of transportation, 171
 in Pennsylvania, 19-24
 factors causing decline, 21
 persons employed, 2
 relative to U. S. production, 20
 trend, 2, 20
 value in 1929, 2
 wages and salaries, 2
 in United States, 2
 irregularity, 150
 location, consideration in policy, 168
 relation to business activity, 24

- Production (Continued)
 summary of changes, 19-24, 136
 summary of shifts, 143
 Profits, 155, 163, 165
 Public interest, 149-152, 155, 166
 Public utilities, electric, 4, 132-135
- Railroad fuel
 description of data, 8
 from Pennsylvania, 30, 41, 127
 imports, 108
 interstate nature of, 181, 182
 lake shipments, 87, 128
 tidewater shipments, 128
- Railroads
 competition, 145
 consumption of coal, 4, 127, 128
 regulation, 145, 171
 restrictions on mine connections, 166
- Rail shipments from Pennsylvania to
 Canada, 43, 44, 103-108
 Illinois-Indiana, 65
 Michigan, 60
 New England, 54
 New Jersey, 52
 New York, 50
 Ohio, 56
 Pennsylvania points, 39, 48
 points outside the state, 40, 41
- Reconsignments, 46
 Reese, John F., 15
 Regulation
 competing sources of energy, 173
 Federal, 157-166, 168-174
 inconsistent policies, 154
 self-, 154, 155, 157
 state, 156, 157
- Rehabilitation of miners, 163
 Relief for miners, 152, 153, 155, 156, 172
 not permanent solution, 156
 unemployment insurance, 172
 vocational training, 156, 172
 Relocation of industry, cost of, 168
 Remedies, proposed, 153-167
 Representatives of employes, 160
- Reserve, proposal for national, 166
 Resources of bituminous coal
 conservation, 166, 168, 169
 in Pennsylvania, 15-18
 nationalization, 166
 rank of states, 17
 scattered, 3, 145
 skimming, 3, 150
 wastage, 150, 169
- River shipments of Pennsylvania coal,
 25, 29, 39
- Safety, 153, 156
 St. Lawrence River, 85
 Sandusky, 80, 83
 Sault Ste. Marie, 86
Seward's Annual, 10
 Schechter case, 5, 159
 Seasonal changes
 cause of instability, 145
 in lake shipments, 43
- Sectionalism, economic, 157, 168
 Self-regulation, 154
 not in public interest, 155
 under NRA Code, 159
 unlikely, 154
- Shifts in production
 among districts, 5
 causes, 4, 5, 145
 desirable, social cost of, 3, 172
 effects, 5, 149
 to reduce costs, 146
- Short hauls, 171
 Shortages
 of cars, 146, 151
 of coal, 151
- Sisler, James D., 15
 Skimming, 150
 Social costs
 and state regulation, 157
 of regional shifting, 168
 sharing of, 172
- Socialization, 166, 167
 Somerset County, 17, 22

- Somerset-Meyersdale and Cumberland-Piedmont districts
 coal from, to
 foreign markets, 44
 Great Lakes, 42
 New Jersey, 52
 New York, 50
 Pennsylvania pcints, 40, 48
 public utilities, 133
 railroads for fuel, 42, 127
 tidewater, 43, 90
 coal used by mines, 38
 included in Pennsylvania area, 11
 main market outside Pennsylvania, 41
 Southeastern Kentucky district, 11
 Southern Appalachian fields, *see* Southern fields
 Southern fields
 definition, 12
 freight rates on lake cargo, 84
 high-volatile, 90
 low-volatile, 90
 quality of coal for coking, 117
 shipments from, to
 central consuming area, 67
 Great Lakes, 71
 tidewater, 96
 unionization, 76
 Southern West Virginia area
 definition, 11
 lake ports loading coal from, 80
 shipments from, to
 central consuming area, 68
 Great Lakes, 72-73
 Illinois-Indiana, 64
 Michigan, 61
 Ohio, 58
 public utilities, 133
 vessels for fuel, 132
 tidewater port loading coal from, 95
 Southern Wyoming Coal Operators' Association, 9
 Stabilization under Guffey-Snyder Act, 163, 164
 see also Self-regulation
 Standard of living, 169
 State regulation, 156
 Statistics, collection of, 158
Status quo, 154
 Steamships, *see* Vessels
 Steel industry, 4, 23, 120-124
 Stonega district, 90
 Storage, 24, 150
 Stores, company, 160
 Strikes, 73, 92, 108, 150, 151
 Subsistence homesteads, 155
 Supreme Court, 5, 157, 159
 Taxation, 150, 159, 166
 Technological change, 145, 149
 Tennessee
 lake ports loading lake coal from, 80
 shipments to lakes, 73
 see also Eastern Kentucky-Tennessee area
 Thacker district, 11, 90, 99
 see also Kenova-Thacker
 Tidewater Bituminous Coal Statistical Bureau, 9
 Tidewater shipments
 amount, 88
 destination, 92-94, 100-102
 exports, 92, 101, 106
 of Pennsylvania coal, 29, 43, 88
 origin of, 88-92, 95-102
 ports loading, 95-102
 railroad freight rates, 102
 railroad fuel, 128
 receipts of, in
 Maryland, 94, 101
 New England, 55, 94
 New Jersey, 53, 94
 New York, 51, 94
 Pennsylvania, 49, 94
 vessel fuel, 93, 132
 Toledo port, 80, 83
 Transportation
 competition, 145
 inefficiency of long-haul
 reduction of costs, 164
 see also Railroads, Trucks, Vessels
 Trucks
 competition, 145
 lack of regulation, 145
 shipment by, in Pennsylvania, 28, 38

- Tug River district, 11, 90, 100
- Unemployment, 5
 caused by mechanization, 146
 cost of, sharing, 168
 insurance, 172
 transfer of displaced miners, 172
see also Relief for miners
- Unfair methods of competition, 159, 160
- Unionization, 76, 162, 163
- Unions, 76, 160, 162, 163, 167
- U. S. Bureau of Mines, 7, 9, 45, 158
- U. S. Coal Commission (of 1922), 158, 164, 166, 171
- U. S. Fuel Administration, 158
- U. S. Geological Survey, 15, 133, 157
- Utah, 17
- Vessel fuel, 128-132
 Atlantic ports, 93, 132
 from Pennsylvania, 30, 131
 lake vessels, 130
 ocean vessels, 132
 origins, 131, 132
 shipped by lake, 87
- Vessels
 competition, 145
 lack of regulation, 145
- Virginia
 coal deposits, 17
 shipments to tidewater from, 90, 95, 99, 132
- Virginia area
 definition, 11
 lake ports loading coal from, 80
 shipments from, to
 central consuming area, 68
 Great Lakes, 73
 tidewater, 90
 tidewater port loading coal from, 96
- Vocational training, 156, 164, 172
see also Relief for miners
- Wage agreements
 lack of coordination, 162
 under Guffey-Snyder Act, 160
see also Jacksonville agreement
- Wage cutting
 advantage transitory, 150
 resistance, 150
 to reduce costs, 146
- Wage differentials
 among districts, 162
 control, 170, 171
 thin-seam, 162
 unionism, 162, 163
- Wage rates
 coordination, 162, 163, 170, 171
 reduced to secure lower costs, 146
 unionism and differentials, 162, 163
- Wages, total, in bituminous coal mining
 in Pennsylvania, 2
- Wagon, *see* Truck
- Washington County, 17, 22
- Wasteful methods of mining
 caused by over-capacity, 150
 control, 169, 170
- Water power, 3, 133, 173
see also Competing sources of energy
- West Virginia
 coal deposits, 17
 coal used for coking in, 124
 shipments from, to
 coke producers, 60, 126
 public utilities, 133
 railroads for fuel, 128
 tidewater, 96
 vessels for fuel, 132
see also Northern West Virginia area,
 Southern West Virginia area, West
 Virginia area
- West Virginia area
 definition, 11
 shipments from, to
 foreign markets, 105
 Michigan, 60
 New York, 51
 Ohio, 58
- West Virginia Panhandle district, *see*
 Western Pennsylvania-Panhandle
- Western Pennsylvania
 beehive coke industry, 116
 freight rates from, 41, 62, 77
 tidewater shipments from, 99

- Western Pennsylvania-Panhandle district
coal from, to
 central consuming area, 68
 foreign markets, 43
 Great Lakes, 42, 71
 New Jersey, 52
 New York, 50
 Ohio, 58
 Pennsylvania points, 39, 48
 public utilities, 133
 railroads for fuel, 42, 127
 tidewater, 43, 90, 99
coal used at mines, 36
- Western Pennsylvania-Panhandle district—(Continued)
definition of, 11
Westmoreland County, 17, 22
Westmoreland district, 90
Winding Gulf field, 11, 90
Wisconsin, 87
World War
 demand for coal, 4
 effect on distribution, 9, 30, 75
 U. S. Fuel Administration, 158
Wyoming, 17
- Young, William Harvey, 133

PUBLICATIONS *
of the
BUREAU OF BUSINESS RESEARCH

STUDIES IN BUSINESS ADMINISTRATION

Publication No. 1, Business Forecasting,† by Joseph M. Gillman,
1925

Publication No. 2, Housing Rents in Pittsburgh, Pennsylvania,†
Joseph M. Gillman, Director, 1926

Publication No. 3, Residence Construction and Other Factors
Which Have Determined Rent Levels in Pittsburgh, Pennsyl-
vania, Joseph M. Gillman, Director, 1926

Rent Levels in Pittsburgh, Pennsylvania, and Their Causes†
(a combination of Nos. 2 and 3 above), by Joseph M. Gillman,
1926

Barometer No. 1, The Iron and Steel Industry, by Joseph M.
Gillman, 1927

Barometer, No. 2, The Price of Pig Iron, by Joseph M. Gillman,
1927

Barometer No. 3, The Bituminous Coal Industry,† by Joseph M.
Gillman, 1927

MISCELLANEOUS PUBLICATIONS

Changes in Pittsburgh's Business Conditions, John H. Cover,
Director, 1928

Consumer Attitude toward Packaging of Meats,† John H. Cover,
Director, 1930

PUBLICATIONS (continued)

PERIODICAL

PITTSBURGH BUSINESS REVIEW, A Monthly Summary of Business and Economic Conditions in the Pittsburgh District. In addition to current business data, most issues include special articles dealing with economic data and economic problems of the region. A list of special articles is shown in the October, 1935 issue. (Vol. I, Nos. 1-13, December, 1930—December, 1931, inclusive. Thereafter, 12 numbers to the volume.)

BUREAU OF BUSINESS RESEARCH MONOGRAPHS

- No. 1, **Housing Status of Salaried Workers Employed in Pittsburgh**, by Theodore A. Veenstra, 1932, \$1.00
- No. 2, **Regulation of Intercoastal Commerce**, by Howard C. Kidd, 1932, \$1.00
- No. 3, **The City Real Estate Tax in Pittsburgh**, by J. P. Watson, 1934, \$1.00
- No. 4, **Regional Shifts in the Bituminous Coal Industry with Special Reference to Pennsylvania**, by Wilbert G. Fritz and Theodore A. Veenstra, 1935, \$2.00

*Available without charge unless otherwise noted.

†Supply exhausted.

CHECKED
2003-04