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# **The Changing Structure of the U.S. Coal Industry: An Update**

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**Energy Information Administration**  
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## Preface

Section 205(a)(2) of the Department of Energy Organization Act of 1977 (Public Law 95-91) requires the Administrator of the Energy Information Administration (EIA) to carry out a central, comprehensive, and unified energy data and information program that will collect, evaluate, assemble, analyze, and disseminate data and information relevant to energy resources, reserves, production, demand, technology, and related economic and statistical information.

The purpose of this report, *The Structure of the U.S. Coal Industry: An Update*, is to provide a comprehensive overview of changes in the structure of the U.S. coal industry between 1976 and 1991. The structural elements examined include the number of mines, average mine size, the size distribution of mines, and the size distribution of coal firms. The report measures changes in the market shares of the largest coal producers at the national level and in various regions. The Central Ap-

palachian low-sulfur coal market is given special attention, and the market for coal reserves is examined. A history of mergers in the coal industry is presented, and changes in the proportions of U.S. coal output that are produced by various types of companies, including foreign-controlled firms, are described. Finally, the impact of post-1991 mergers on the structure of the industry is estimated.

The legislation that created the EIA vested the organization with an element of statutory independence. The EIA does not take positions on policy questions. The EIA's responsibility is to provide timely, high-quality information and to perform objective, credible analyses in support of deliberations by both public and private decisionmakers. Accordingly, this report does not purport to represent the policy positions of the U.S. Department of Energy or the Administration.

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## Executive Summary

The number of U.S. mines producing coal in 1991 was less than half the number in 1976 (Table ES1). Yet, U.S. coal production increased by 45 percent during this period, as the average mine size more than tripled.<sup>1</sup> By 1991, nearly two-thirds of U.S. coal was produced by only 7 percent of the Nation's mines—those mines with an annual output of 1 million short tons or more.

Coal company size (in terms of production) also increased over the 15-year period. In 1991, firms producing more than 20 million short tons of coal per year accounted for 41 percent of U.S. coal production, up from 22 percent in 1976. Firms producing 3 million tons or more annually, termed “major coal producers” in this report, accounted for 77 percent of national coal production in 1991, up from 57 percent in 1976.

The increase in the size of coal firms is attributable to several factors. Primarily, production has shifted toward the West, where low-sulfur coal is produced from thick seams in large surface mining operations. Large firms are better situated to meet the long-term capital requirements for the gigantic drag lines and shovels used in these operations. In addition, many small firms left the industry in the 1980's, as coal prices fell and they could not recover their costs. Many other firms consolidated through mergers.

Sometimes large firm size is associated with a lack of competition; however, the important factor is not firm size *per se*, but the share of an industry's output that is accounted for by the largest firms. Generally, if the four largest sellers account for more than 50 percent of

**Table ES1. Elements of Structural Change in the U.S. Coal Industry, 1976, 1986, and 1991**

Element	1976	1986	1991
<b>Number of Mines</b> .....	6,553	4,424	3,022
<b>Average Mine Size</b> (thousand short tons) .....	105	201	330
<b>Number of Major Coal Producers</b> <sup>a</sup> .....	34	52	53
<b>Percent of U.S. Coal Production Accounted for by:</b>			
Mines Producing 1 Million Tons or More per Year .....	NA	55.8	66.1
Firms Producing More Than 20 Million Tons per Year .....	22.0	32.9	41.4
Major Coal Producers .....	57.4	73.9	77.1
<b>Percent of U.S. Coal Production Accounted for by:</b>			
Four Largest Producers .....	24.6	19.6	21.8
Eight Largest Producers .....	33.6	30.3	32.6
Foreign-Controlled Major Coal Producers .....	1.4	6.4	14.3
<b>Percent of Major Producers' Coal Production Accounted for by:</b>			
Coal Companies .....	34.7	26.6	17.3
Oil and Gas Companies .....	32.2	43.9	31.3
Electric Utilities .....	10.8	14.9	14.5
Steel Companies .....	8.5	4.5	3.4
Other Companies .....	13.8	10.1	33.4

<sup>a</sup>Major producers are firms producing 3 million tons or more of coal per year.

NA = not available.

Sources: Data taken from the body of this report.

<sup>1</sup>Data that are not presented in Table ES1 are taken from the body of this report.



market sales, the firms may not act independently and prices may be set above competitive levels. At the national level, the top four coal producers' share of total output is well under 50 percent. It increased from 20 percent in 1986 to 22 percent in 1991, but is still lower than its 1976 level of 25 percent. The situation is similar for coal production in Appalachia. The output share of the largest four firms was substantially higher in the Interior Region (39 percent in 1991) and the Western Region (38 percent), where there are relatively few small producers in comparison with Appalachia.

With the enactment of the Clean Air Act Amendments of 1990, there has been renewed interest in the market for low-sulfur coal. Energy Information Administration data indicate that coal production from the major low-sulfur coal districts of Central Appalachia is not concentrated in the hands of a few companies. In 1991, the top four producers accounted for only 19 percent of the region's output. The production share of the largest firms is substantially higher in the low-sulfur coalfields of the West.

A series of significant coal mergers not only contributed to changes in the size distribution of coal firms, but also affected the distribution of U.S. coal production by type of company. In 1991, independent coal companies (coal producers that were not controlled by companies in other industries) accounted for only 17 percent of U.S. coal production, compared with 35 percent in 1976. The share controlled by oil and gas companies rose to 44 percent by 1986, but then it fell as oil firms concentrated on their core business and began to sell their coal subsidiaries. The electric utilities' share rose from 11 percent in 1976 to 15 percent in 1986 and held that level in 1991. The steel companies' share fell from 9 percent

in 1976 to only 3 percent in 1991, as domestic coke production declined. The share controlled by other companies, primarily large conglomerates, increased from 14 percent to 33 percent over the same period, primarily due to the acquisition of Peabody Holding Co., the Nation's largest coal producer, by Hanson PLC, a British conglomerate.

As the coal industry became more international in scope, foreign companies increased their involvement in U.S. coal production. In 1976, only one of the Nation's major coal producers was controlled by a foreign company, accounting for 1 percent of U.S. coal production. By 1991, eight of the Nation's major coal producers were controlled by foreign firms, accounting for 14 percent of U.S. coal production. Again, most of this increase was due to the acquisition of Peabody by Hanson. (Control is inferred from an ownership interest of more than 50 percent.) Foreign-affiliated U.S. coal companies, in which a direct foreign investor owns at least 10 percent of the voting securities, accounted for 24 percent of U.S. coal production in 1991.

Although 1991 is the latest year for which comprehensive coal production data are available, significant mergers in 1992 and the first part of 1993 continued to affect the coal industry. Generally, these mergers intensified the trends that developed between 1986 and 1991—the increasing concentration of coal production under the control of the largest producers, the increasing proportion of U.S. coal produced by foreign-controlled firms, the exit of oil and gas companies from the U.S. coal industry, and the acquisition of U.S. coal producers by highly diversified companies.

# 1. Introduction

A series of mergers in the 1960's resulted in a shift in coal production from small, independent coal companies to large, diversified firms. At the same time, several major oil companies and electric utilities acquired coal companies or leased Federal coal reserves in the West. These changes in the structure of the Nation's coal industry raised concerns that large firms and/or firms in other energy industries would dominate the coal industry and that competition among firms might be diminished. These concerns were heightened by the sharp rise in coal prices that followed the oil embargo of 1973-74. Several Congressionally mandated studies were undertaken to examine the competitiveness of the coal industry. The consensus of these studies was that the industry was still competitive, despite the developments cited above. This conclusion was given additional credence by the rapid expansion of coal production capacity during the 1970's and by the rise in coal mining productivity and the fall in coal prices in the 1980's.<sup>1</sup>

On the other hand, many small, inefficient coal producers left the industry as coal prices fell. This, in combination with another wave of mergers in the 1980's, led to renewed concern about the dominance of large companies, the competitiveness of the industry, and the possible impacts on low-sulfur coal markets. There were additional concerns over the increasing participation of foreign firms in U.S. coal production. A previous Energy Information Administration (EIA) report<sup>2</sup> addressed all of these concerns, concluding that:

- Between 1976 and 1986, the share of U.S. coal that was produced by the major coal producers—particularly those mining more than 20 million tons per year—increased, as did the shares of oil and gas companies and electric utilities. Over the same period, the production shares of small coal producers, independent coal companies, and steel companies declined.
- The share of coal production that was accounted for by the largest four and the largest eight coal

producers (standard measures of the concentration of production under the control of the largest firms) declined between 1976 and 1986 at the national level and in three major coal-producing regions (Appalachia, the Interior Region, and the Western Region). By 1986, the four largest producers accounted for only 20 percent of U.S. coal production, and the eight largest firms accounted for 30 percent. This production concentration is low compared to that of most major U.S. industries.

- The share of total U.S. coal reserves held by the largest private reserve holders did not change significantly between 1976 and 1985 (the latest year for which data were available at that time).
- Although major coal producers were acquiring eastern low-sulfur coal reserves, it did not appear that low-sulfur coal markets would be dominated by a few large companies.
- The coal industry had become increasingly international in scope, and an increasing percentage of U.S. coal was produced by foreign-controlled companies.

The U.S. coal industry continued to evolve, and several major acquisitions of U.S. coal companies occurred in the past few years. The changes have been great enough to warrant a re-examination of the structure of the U.S. coal industry. The purpose of this report is to update the previous EIA report to 1991, the latest year for which comprehensive data are available.

Although data are not available for later years, the effects of the mergers that occurred between 1991 and the middle of 1993 are estimated by applying the new ownership patterns to the 1991 data base. This gives a rough idea of the current structure of the U.S. coal industry. Although it reflects the post-1991 changes in coal company ownership, it does not reflect the post-1991 changes in company coal production.

<sup>1</sup>For a broad view of major changes in the U.S. coal industry, see Energy Information Administration, *The U.S. Coal Industry, 1970-1990: Two Decades of Change*, DOE/EIA-0559 (Washington, DC, November 1992).

<sup>2</sup>Energy Information Administration, *The Changing Structure of the U.S. Coal Industry 1976-1986*, DOE/EIA-0513 (Washington, DC, June 1988).

## 2. The Growing Size of U.S. Coal Mines and Coal Producers

In terms of annual output, the average size of U.S. coal mines increased from 201,000 tons in 1986 to 330,000 tons in 1991—an increase of 64 percent in 5 years.<sup>3</sup> This was the continuation of a long-term trend, as the average mine size tripled between 1976 and 1991 (Table 1). The average mine size increased with the development of large mines in the West, where low-sulfur coal from thick seams could be produced by surface methods at low cost. At the same time, thousands of small and relatively inefficient Appalachian mines were closed. As coal prices fell during the 1980's, these relatively high-cost operations could not recover their production costs.

Nationwide, the number of coal mines fell from roughly 4,400 in 1986 to about 3,000 in 1991—less than half the number of mines operating in 1976. Yet, U.S. coal production increased by 45 percent between 1976 and 1991, as the average mine output tripled.

### Size Distribution of U.S. Coal Mines

The size distribution of U.S. coal mines changed significantly over the past 15 years. In 1991, 25 percent of the Nation's coal mines produced 200,000 tons or more per year, compared with about 17 percent in 1986 and 8 percent in 1976. On the other hand, mines producing less than 50,000 tons per year dwindled in importance. They represented 47 percent of the total number of mines in 1991, down from 57 percent in 1986 and 67 percent in 1976.

Although nearly half of all U.S. coal mines produced less than 50,000 tons of coal in 1991, they accounted for only 2.4 percent of U.S. coal production, down from 4.3 percent in 1986 and 10 percent in 1976. In contrast, large mines accounted for a large and growing share of coal production. Mines producing half a million tons or more accounted for 77 percent of coal production in 1991, up from 69 percent in 1986 and 54 percent in 1976. In 1991, 7 percent of the Nation's coal mines, each producing 1

million tons or more, yielded 66 percent of total U.S. coal production.

In absolute terms, the combined output of mines producing 500,000 tons or more of coal per year rose from 368 million tons in 1976 to 764 million tons in 1991 (Figure 1). Over the same period, the combined output of mines producing 99,000 tons or less per year declined from 128 million tons to 57 million tons.

## Size Distribution of Major Coal Producers

U.S. coal production shifted not only toward large coal mines but also toward large coal producers—often companies that owned several coal-producing subsidiaries or several large coal mines. In 1976, only 34 firms were major coal producers<sup>4</sup> (defined as firms producing 3 million tons or more of coal per year), accounting for 57 percent of U.S. coal production (Table 2). By 1986, the number of major coal producers had risen to 52, yielding 74 percent of total production. In 1991, 53 major coal producers accounted for 77 percent of the Nation's coal production.

During the 1976-1991 period, production shifted toward the top of the size distribution; i.e., firms producing more than 20 million tons of coal per year. In 1976, there were only three firms in this size class, accounting for 22 percent of total production. In 1986, nine firms fell into this class, mining 33 percent of total production. The trend continued, and in 1991 a dozen of these giant producers yielded 41 percent of U.S. coal production. In absolute terms, the combined output of firms producing more than 20 million tons of coal per year rose from 149 million tons in 1976 to 413 million tons in 1991 (Figure 2). In contrast, the combined output of firms producing less than 3 million tons per year fell from 289 million tons to 228 million tons over the same period.

Several factors contributed to the increasing average size of coal producers and the growing importance of large firms in the U.S. coal industry. In the 1970's, electric utilities, by far the largest consumers of U.S. coal, were faced with sharply rising oil prices and natural gas shortages. As they turned toward coal as a

<sup>3</sup>Throughout this report, tons refers to short tons.

<sup>4</sup>The major coal producers are listed in Appendix A, Tables A1, A2, and A3.

**Table 1. Number of U.S. Coal Mines, Mine Size Distribution, and Coal Production by Mine Size Class, 1976, 1986, and 1991**

Item	1976	1986	1991
<b>Number of Mines</b> .....	6,553	4,424	3,022
<b>Coal Production</b> (million short tons) .....	685	890	996
<b>Average Mine Size</b> (thousand short tons) .....	105	201	330
<b>Mine Size Distribution<sup>a</sup></b>			
(percentage of total number of mines)			
1,000,000 short tons and over .....	NA	4.1	6.9
500,000 to 999,000 short tons .....	<sup>b</sup> 4.6	3.8	4.9
200,000 to 499,999 short tons .....	3.8	8.9	12.8
100,000 to 199,999 short tons .....	10.4	10.8	12.3
50,000 to 99,999 short tons .....	13.8	15.4	15.6
10,000 to 49,999 short tons .....	39.1	28.8	26.6
Less than 10,000 short tons .....	28.3	28.2	20.8
<b>Coal Production by Mine Size Class<sup>a</sup></b>			
(percentage of total production)			
1,000,000 short tons and over .....	NA	55.8	66.1
500,000 to 999,999 short tons .....	<sup>b</sup> 54.2	13.3	10.5
200,000 to 499,999 short tons .....	12.1	13.7	12.2
100,000 to 199,999 short tons .....	14.8	7.4	5.3
50,000 to 99,999 short tons .....	8.9	5.5	3.4
10,000 to 49,999 short tons .....	8.7	3.8	2.1
Less than 10,000 short tons .....	1.3	0.5	0.3

<sup>a</sup>1976 distributions exclude anthracite mines, which numbered 392, accounting for 6 percent of the total number of mines and less than 1 percent of total coal production.

<sup>b</sup>Includes mines producing 500,000 short tons and over.

NA = not available.

Note: Percentages may not add to 100 because of independent rounding.

Sources: Energy Information Administration, *Coal—Bituminous and Lignite in 1976*, DOE/EIA-0118/1(76) (Washington, DC, December 1978), Table 15; *Coal Production 1986*, DOE/EIA-0118(86) (Washington, DC, January 1988); and *Coal Production 1991*, DOE/EIA-0118(91) (Washington, DC, October 1992), Tables 1 and 4.

boiler fuel, they looked for large coal suppliers that were capable of meeting the lifetime requirements of their huge new coal-fired power plants. Some utilities even established their own coal mining subsidiaries to ensure the availability of coal supplies. In addition, as coal production shifted toward the thick low-sulfur coal seams of the West, a greater proportion of U.S. coal was mined from huge surface mines. For example, in the Powder River Basin of Wyoming, eight mines produced more than 10 million tons of coal each in 1991.<sup>5</sup>

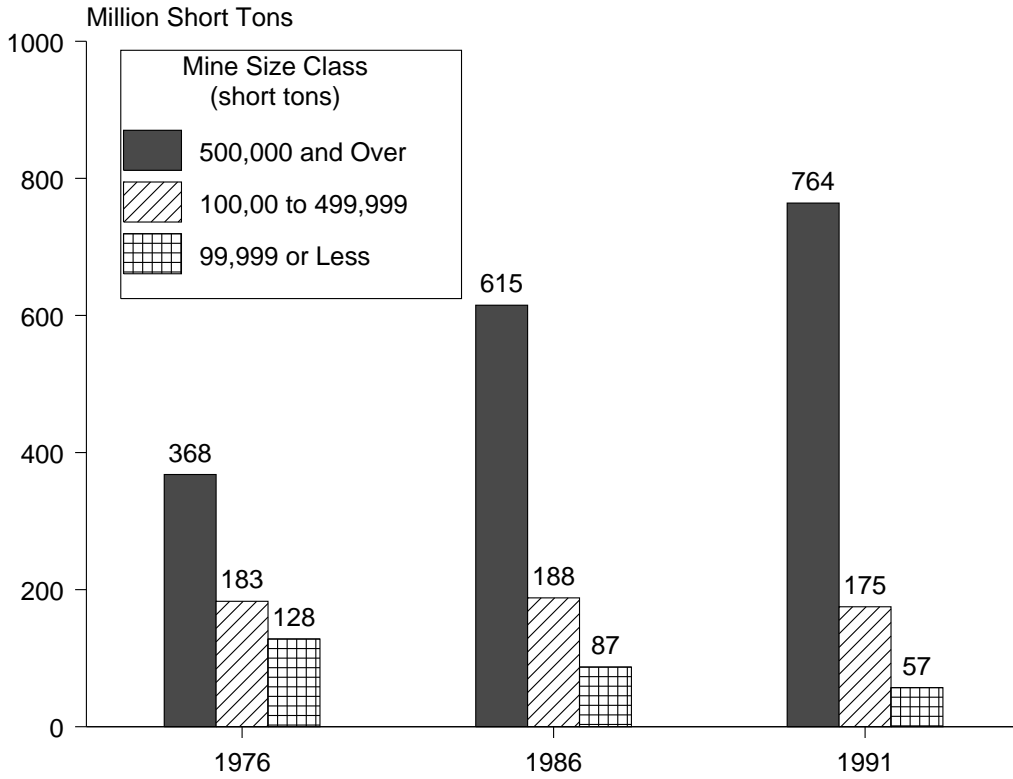
Technological change also contributed to the increase in average coal firm size. In the West, large firms were

better suited to meet the capital requirements for gigantic drag lines and shovels. The impact of technological change was also felt in Appalachia and the Interior Region, where it was the larger firms that tended to install continuous mining and longwall equipment. In particular, Consolidation Coal Co., the Nation's second-largest coal producer, was the leader in installing highly productive longwall mining systems.

Another important factor was the decline in coal prices during the 1980's. As prices fell, many small firms that could no longer cover their operating costs left the industry. This contributed to the shift in production from smaller to larger firms.

<sup>5</sup>Eugene R. Slatick, "Wyoming Coal: An Overview," in Energy Information Administration, *Coal Production 1991*, DOE/EIA-0118(91) (Washington, DC, October 1992), pp.1-11.

**Figure 1. U.S. Coal Production by Mine Size Class, 1976, 1986, and 1991**



Note: 1976 data exclude anthracite, which accounted for less than 1 percent of total coal production.

Sources: Energy Information Administration, *Coal-Bituminous and Lignite in 1976*, DOE/EIA-0118/1(76) (Washington, DC, December 1978), Table 15, *Coal Production 1986*, DOE/EIA-0118(86) (Washington, DC, January 1988), and *Coal Production 1991*, DOE/EIA-0118(91) (Washington, DC, October 1992), Tables 1 and 4.



**Table 2. Size Distribution of Major U.S. Coal Producers, 1976, 1986, and 1991**

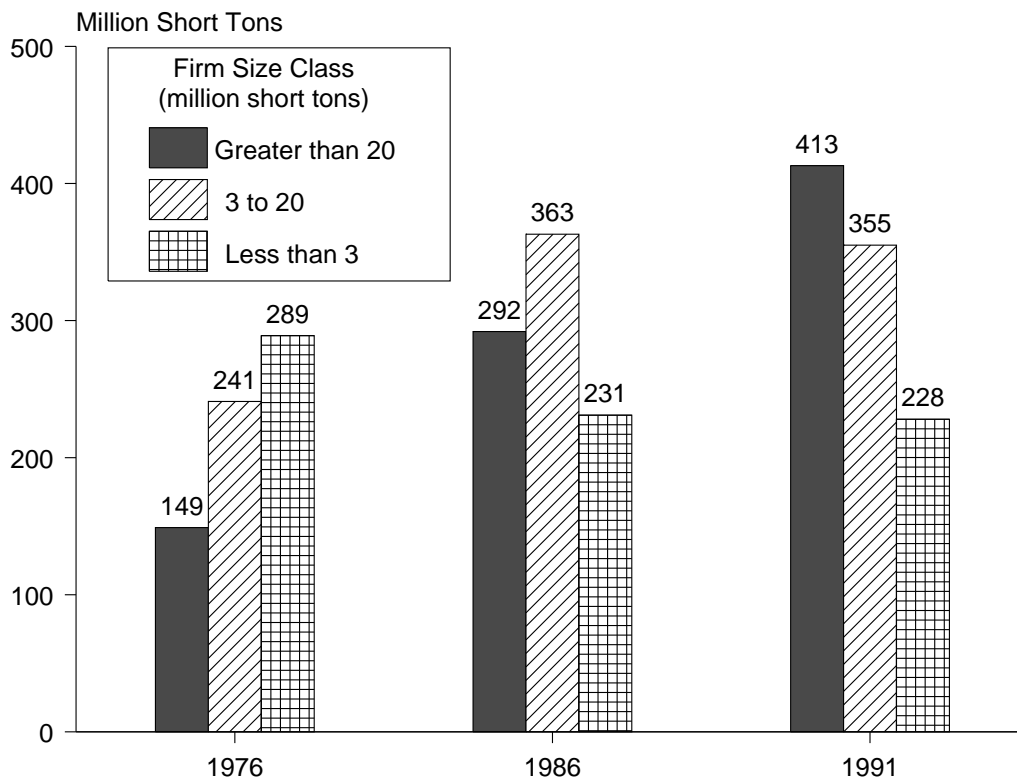
Size Class (million tons)	1976		1986		1991	
	Number of Firms	Percent of Total Production <sup>a</sup>	Number of Firms	Percent of Total Production <sup>a</sup>	Number of Firms	Percent of Total Production
> 20 .....	3	22.0	9	32.9	12	41.4
15-20 .....	3	7.5	5	9.4	6	10.2
10-14.9 .....	5	9.0	9	12.6	10	12.4
5-9.9 .....	13	13.4	14	12.9	8	6.4
3-4.9 .....	10	5.6	15	6.1	17	6.7
<b>Total .....</b>	<b>34</b>	<b>57.4</b>	<b>52</b>	<b>73.9</b>	<b>53</b>	<b>77.1</b>

<sup>a</sup>1976 and 1986 data exclude anthracite, which accounted for less than 1 percent of U.S. coal production in those years.

Note: Totals may not equal sum of components due to independent rounding.

Sources: **1976 and 1986:** *Keystone Coal Industry Manual* and *Keystone News Bulletin*, various issues. **1991:** Energy Information Administration, Form EIA-7A, "Coal Production Report." See Appendix Tables A1-A3.

**Figure 2. U.S. Coal Production by Firm Size Class, 1976, 1986, and 1991**



Note: 1976 and 1986 data exclude anthracite, which accounted for less than 1 percent of total coal production in those years.

Sources: **1976 and 1986:** *Keystone Coal Industry Manual* and *Keystone News Bulletin*, various issues. **1991:** Energy Information Administration, Form EIA-7A, "Coal Production Report." See Appendix Tables A1-A3.

The last major factor influencing the size distribution of coal producers over the 1976-1991 period was a series of mergers in the coal industry. Mergers were an important means of entry into the coal industry by firms with little or no coal mining experience, such as major oil companies and electric utilities. During the diversification trend of the 1960's and 1970's, acquiring coal companies often was a means of diversifying investment among different energy industries, or among coal operations in different parts of the country. The following chapter presents a detailed discussion of mergers in the U.S. coal industry.

### 3. A History of Mergers and Coal Production by Company Type

#### Mergers

As noted in the previous chapter, coal mergers were one of the principal factors contributing to the growing importance of large firms in U.S. coal production. A series of significant mergers in the coal industry began in the 1960's, when major oil companies began to look toward the Nation's coal resources as their domestic oil reserves were declining. This was followed by the international oil crises of the 1970's, which spurred the oil companies' movement into the coal industry. The higher oil prices resulted in large accumulations of cash that could be invested in the coal industry, which was expected to boom. It was also expected that world oil prices would continue to rise, so that the production of synthetic oil and gas from coal would become profitable. Several steel companies and electric utilities also acquired coal companies as a means of assuring reliable supplies of coal suitable for use in their coke ovens and generating plant boilers.

Another wave of mergers involving coal companies began in 1983 (Table 3). Several coal producers acquired other coal companies or blocks of coal reserves that fit well with their existing production, handling, and processing facilities, or with their marketing strategies. In particular, as more stringent power plant emissions limitations became imminent, many companies sought to acquire eastern low-sulfur coal reserves.

Also, many U.S. iron, steel, and coke plants became obsolete, and the steel industry was hit hard by the recession of the early 1980's. As pig iron and coke production declined, U.S. steel companies needed less coal for making coke, and the sale of their coal assets was an obvious means of improving their cash flow. U.S. Steel, Republic Steel, Armco Steel, LTV Corporation, and others sold many of their coal properties during the first half of the decade. Inland Steel sold its coal subsidiary, the Inland Steel Coal Co., to Consolidation Coal Co. in 1986.<sup>6</sup>

Several major oil and gas companies also began to exit the coal industry in the 1980's.<sup>7</sup> Houston Natural Gas sold Zeigler Coal to a group of managers and investors. Amoco spun off its coal subsidiary, Cyprus Minerals, and Texaco sold the coal properties that had come with its acquisition of Getty. Eastern Gas & Fuel Associates sold its coal mines to Peabody. In 1990, British Petroleum sold Old Ben Coal to Zeigler. In 1991, DuPont, a major oil producer since its acquisition of Continental Oil, sold 50 percent of its Consolidation Coal Co., the Nation's second-largest coal producer. As shown in Chapter 6 of this report, oil and gas companies have continued the divestment of their coal assets. In 1992, Mobil sold Caballo Rojo, its large coal mine in Wyoming, and Sun sold its Oneida Coal subsidiary. In addition, British Petroleum sold Mingo Logan Coal Co. to Ashland Coal Co.<sup>8</sup>

Oil and gas companies have been selling off not only their coal properties but also other assets that they acquired in the process of their diversification into other energy and non-energy industries in the 1970's. In general, they have decided to concentrate on their core businesses—oil and gas exploration, production, refining, and distribution. In addition, a massive upgrading of their refining and distribution systems was necessitated by clean air legislation and regulations. The sale of their non-core businesses was a major means of generating the cash flow needed for their refinery investments. Finally, the decline in coal prices in the 1980's reduced the profitability of their coal operations relative to alternative investments.

While major oil and gas companies and small coal companies were the primary sellers of coal properties during the 1980's, the principal buyers were large independent coal companies and conglomerates; i.e., highly diversified firms. Some of the most important new investors in the U.S. coal industry were foreign companies.

<sup>6</sup>These transactions were reported in various issues of *Mergers and Acquisitions*, *The Merger Yearbook*, *Moody's Industrial Manual*, company annual reports, and coal trade journals.

<sup>7</sup>"Big Oil Quits Coal," *International Coal Report*, September 1992, pp. 13-17.

<sup>8</sup>Ashland Oil Co. is a major shareholder of Ashland Coal Co.

**Table 3. U.S Coal Industry Mergers, 1976-1991**

Year	Acquiring Company	Acquired Company
1976	Ashland Oil Co. Panhandle Eastern Corp. Quaker State Oil Refining Corp. R.L. Burns Corp. R.L. Burns Corp.	Addington Brothers Mining, Inc. Youghiogheny & Ohio Coal Co. Valley Camp Coal Company King Coal Co. Pyro Mining Co.
1977	Shell Oil Co.	R&F Coal Co.
1978	Bow Valley Industries, Ltd. Patrick Petroleum Corp.	Coal Reserves Corp. Belibe Coal
1979	Atlantic Richfield Co. Sun Company, Inc.	Swisher Coal Co. Elk River Resources
1980	NERCO	Sand Mountain Minerals
1981	NERCO NERCO	P-V Corp. Sequatchie Valley Coal Co.
1982	Bow Valley Industries, Ltd. Trafalgar Industries, Inc.	Harlan Fuel Co. Avery Coal Co.
1983	Frontier Resources Corp. Gulf Resources & Chemical Corp. Rio Verde Energy Corp. Rio Verde Energy Corp. Sun Company, Inc.	Pocahontas Coal & Gas Corp. R.D. Baughman Coal Co. Mountain Creek Minerals, Inc. United Minerals, Inc. Whitmaker Coal Corp.
1984	A.F. Budge, Ltd. Chevron Corp. Coal Ridge Fuel, Inc. Kaneb Services, Inc. New York State Electric & Gas Corp. Standard Coal Co. The Broken Hill Proprietary Co., Ltd. United Coal Co.	S.S. "Joe" Burford, Inc. Gulf Oil (Pittsburg & Midway Coal) River Processing, Inc. Kentucky Gem Coal Co. The Helen Mining Co. Zapata Fuels, Inc. Utah International Patrick Coal Co.
1985	Drummond Coal Co. Houston Industries (Utility Fuels) Quaker State Oil Refining Corp. Standard Oil (Old Ben Coal Co.) Sun Company, Inc. Transco Energy Co.	Alabama By-Products Corp. Getty Coal Co. The Helen Mining Co. Blossom Coal Co. Soldier Creek Coal Co. Interstate Coal Co., Inc.

**Table 3. U.S. Coal Industry Mergers, 1976-1991 (Continued)**

Year	Acquiring Company	Acquired Company
1986	AMAX, Inc. Du Pont (Consolidation Coal Co.) Du Pont (Consolidation Coal Co.) Investor Group Occidental Petroleum (Island Creek) Russell Coal, Inc. Russell Coal, Inc. Westmoreland Coal Co.	Castle Gate Coal Co. Sierra Coal Co. Inland Steel Coal Co. Zeigler Coal Co. Lauren Run Mining Co. Bankhead Mining Co. Sand Mountain Minerals Cleancoal Terminal Co.

**Table 3. U.S. Coal Industry Mergers, 1976-1991 (Continued)**

Year	Acquiring Company	Acquired Company
1987	ARCO Coal Co. Imperial Pacific Investments Investment Group Occidental Petroleum Transco Coal Co.	Trail Mountain Coal Co. Hawks Nest Mining Co. Royal Land Co. Laurel Run Mining Co. Blossom Coal Co.
1988	Arch Minerals Cumberland Resources, Inc. Cyprus Coal Cyprus Coal James River Coal James River Coal Ohio Valley Resources, Inc. Peabody Coal Pyro Energy Corp. Recovery Resources Corp.	Diamond Shamrock Coal Goldsil Mining & Milling, Inc. Colorado Westmoreland Carbon County Coal Belle County Coal Co. McCoy Elkhorn Coal Corp. Nacro Mining Co. Eastern Associated Coal Jim Smith Coal Co. ND Resources, Inc.
1989	Addington Resources, Inc. Addington Resources, Inc. Addington Resources, Inc. Amvest Corp. AOI Coal Co. AOI Coal Co. Arch Mineral Corp. Arch Mineral Corp. Arch Mineral Corp. Ashland Coal, Inc. Ashland Coal, Inc. Big River Minerals Corp. Coastal Corp. Cyprus Minerals Co. Diamond Coal MAPCO Coal Inc. Minnesota Power Nicco Corp. Ohio Valley Resources, Inc. PacifiCorp	Sandy Fork Mining, Inc. South Imperial Land Co. Little Creek Coal Co. Terry Eagle Coal Co. Darmac Coal, Inc. Kittaning Coal Co. Hansford Coal Ford Coal Pratt Mining Coal-Mac Inc. Mingo-Logan Coal Co. Ryan & Robinson Coal Co. Lake Coal Co. Hawks Nest Coal Co. Amscot Coal Jno. McCall Baukol-Noonan Majestic Mining, Inc. Nacco Mining Co. Bright Coal Group

**Table 3. U.S. Coal Industry Mergers, 1976-1991 (Continued)**

Year	Acquiring Company	Acquired Company
1990	Addington Resources Inc. AMAX American Metals & Coal International, Inc. Ashland Coal Inc. Coastal Corportion Drummond Coal Inc. Hanson PLC Pittsburg & Midway Coal Mining Co. Sunnyside Mines Inc. Zeigler Coal Holding Co.	Peyton Coal Company Cannelton Holding Co. Virginia Crews Coal Company Mingo Logan Coal Co. Kingwood Mining Company Fort Union Coal Company Peabody Holding Company Black Beauty Resources, Inc. Potter Mining Company, Inc. Franklin Coal, Old Ben Coal
1991	Addington Resources, Inc. AMAX Buck Creek Coal Company Cambridge Land Co./Weston Mining Corp. Drummond Coal Inc. (Marigold Land Co.) Entech, Inc. Grace Energy Corporation Intermountain Power Agency Pacificorp Quent, Inc. Rheinbraun AG	Quality Coal Company Cannelton Industries Buck Creek Mining Company Sovereign Coal/Majestic Collieries Mobil Coal Producing Inc. Wyoming Fuel Company Colowyo Coal Company Genwal Coal Company, Inc. Glenrock Coal Company Florence Mining Company Consolidation Coal (50%)

Sources: *The Merger Yearbook* (Boston: Cambridge Corporation), 1987-1989; *The Merger Yearbook, Domestic* (New York: Securities Data Company), 1990; *Mergerstat Review* (Schaumburg, IL: Merrill Lynch Business Brokerage and Valuation), various years; *Mergers and Acquisitions in the U.S. Coal Industry 1990-1992* (Boulder, CO: Resource Data International, Inc., 1993), Table 2; and coal trade journals.

Mergers were one means by which different types of companies entered the coal industry. Other methods of entry included joint ventures, stock purchases, and the purchase of coal-related assets, such as mines or coal reserves. These types of acquisitions continued to play an important role in the restructuring of the coal industry. Several of these transactions were completed in the years 1990-1992 (Table 4).

### Coal Production by Company Type

The net effects of the mergers and other acquisitions of coal assets (as well as divestitures) are reflected in the changing shares of the major coal producers' aggregate output controlled by various types of company. Between 1976 and 1991, there were significant changes in the production shares of independent coal companies, oil and

gas companies, electric utilities, steel firms, and other companies, including diversified firms, metals mining companies, and construction firms (Table 5). It should be recalled that the major coal producers accounted for about three-fourths of U.S. coal production in 1991.

In all 3 years examined, about a dozen of the major coal companies were independent coal producers. This group of companies accounted for the largest share of the major coal producers' output (35 percent) in 1976 (Figure 3). By 1986, their share had dropped to 27 percent, as the shares of oil and gas companies and electric utilities increased. In 1991, the independent coal companies' share of the majors' production was only 17 percent. This was primarily because of the sale of Peabody Holding Co. to Hanson PLC, a British conglomerate, in the previous year. Although Peabody was a joint venture among six



companies in 1976 and five firms in 1986, it was classified as an independent coal company in those years because none of the joint venture partners held a controlling interest.

In 1976, nine oil and gas companies accounted for 32 percent of the major coal companies' production. In 1986, 21 oil and gas companies were major coal producers, accounting for by far the largest share—44 percent—of the majors' output. As oil and gas companies began to divest their coal subsidiaries, the number of oil and gas-affiliated major coal producers fell to 14 by 1991, accounting for 31 percent of the major coal producers' output.

Both the number and the production share of utility-affiliated major coal producers rose between 1976 and 1986. By 1991, their number had increased to 10, but their share of the major coal producers' output remained at about 15 percent. The primary reason that their share was not higher in 1991 is that the 5.6 million tons of coal produced by Texas Utilities Mining Co. for use in an Aluminum Company of America dedicated power plant was reallocated from Texas Utilities to Alcoa for 1991. This was done by EIA because it was determined that Alcoa owns the coal reserves.

In 1976, two steel companies were among the Nation's 10 largest coal producers, and steel companies accounted for 9 percent of the combined output of the major coal producers. In 1986, five steel companies

**Table 4. Coal Asset Acquisitions, 1990-1992**

Acquirer	Seller	Assets
Addington Resources Inc.	Classic Coal Company	Reserves
Anker Energy Corporation	Phillippi Mining/Black Diamond Energies	Coal operations and reserves
Arch Mineral Corporation	Blue Diamond Coal Company, Inc.	Scotia mine and reserves
Consolidation Coal Company	Bright Mining and Land Company	Birch, Canfleid and Falls tracts
Consolidation Coal Company	Exxon Coal and Minerals Company	Undeveloped reserves
Cax Farm Coal	PG&H Coal Company	Thomas-Britt mine
Chesapeake Coal Company	Ashland Coal Inc.	Samoyed Energy Company mine
Drummond	Armco	Undeveloped West Virginia coal lands
Dupont Energy Company	Robert L. Warren Jr. Group	Undeveloped reserves
Electric Fuels Corporation	United Coal Company	Belfry #5 & #6 mines
NERCO Coal Corporation	Pittston Coal Company	Wilden coal & timber reserve
North Cambrio Fuel Company	Benjamin Coal Company	Coal properties
Peabody Holding Group	Arch Mineral Corporation	Parkway mine and reserves
Quaker Coal Company	LTV Steel Company, Inc.	Republic mine
Somerset Mining Company	Kolser Coal Corporation	Coal reserves
Teco Energy, Inc.	Bauguesfamily/Garland Coal	James Spur, Inc. coal assets
Arch Mineral Corporation	Millers Cave Energy Company	Reserves
Arch Mineral Corporation	Straight Creek Processing Co.	Straight Creek preparation plant
B.F.C. Coal Company	Green Construction of Indiana, inc.	Craney mine and reserves
Mitsubishi Corporation	Cyprus Minerals Company	Orchard Valley mine
Morrison Knudsen Corporation	Imperial Pacific Investments	Harewood property
Rauer Coal Corporation	Bethlehem Steel Corporation	Barbour No. 108 mine
Rockspring Development	Exxon/Columbia Coal Gasification	Mine in West Virginia
TECO Energy, Inc.	Jen Coal Corp./Traveller Coal	Pike-Letcher Coal Partners
AMAX Coal Industries Inc.	Addington Resources Inc.	Bell's Creek tract
AMVEST CORPORATION	Bethlehem Steel Corporation	Nicholas West reserve
Arch Mineral Corporation	Quaker State Corporation	Shrewsbury Mining Company assets
Ashland Coal Inc.	Bethlehem Steel Corporation	Hobet reserves
A.T. Massey Coal Company, Inc.	Bethlehem Steel Corporation	Mare Fork and other reserves
A.T. Massey Coal Company, Inc.	Island Creek Corporation	Big Creek 1 & 2 mines
A.T. Massey Coal Company, Inc.	United Coal Company	Ridgeway Division
Black Beauty Coal Company	Koester Group	Coal operations and reserves
Electric Fuels Corporation	Inspiration Coal Development Company	Plateau Fuels operations
Freeman Resources	Graves, Donald/Harris, Ross	Coal properties
Great Northern Properties LP	Burlington Resources Inc.	Coal reserves
Montanna Coal Company	A.T. Massey Coal Company, Inc.	RPI plant and reserves
Mon Valley Steel Inc.	A.T. Massey Coal Company, Inc.	Labelle preparation plant
Pacificorp	ARCO Coal Company	Trail mountain mine
Peabody Holding Group	American Electric Power Company, Inc.	Martinka mine (Tygart River mine)
Rochester & Pittsburgh Coal Company	Bethlehem Steel Corporation	Mine No. 84 and reserves
Solar Sources Inc.	B.F.C. Coal Company	Coal assets
Solar Sources Inc.	Green Construction of Indiana	Coal assets
Stearns Mining Company	Blue Diamond Coal Company, Inc.	Justus mine

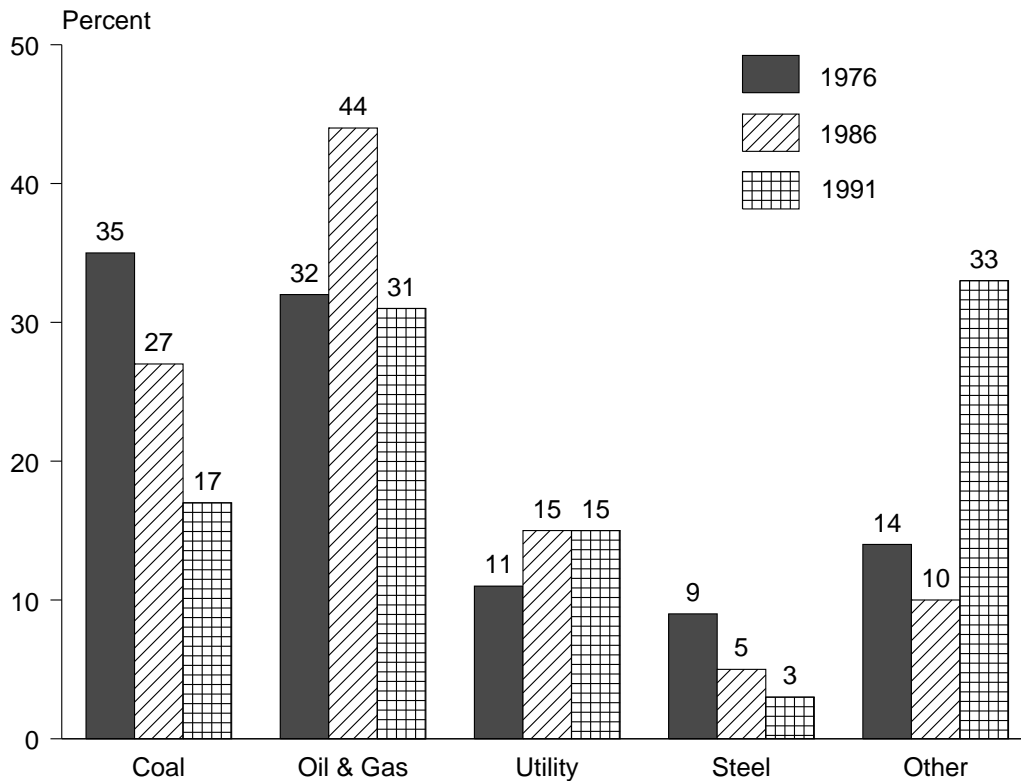
**Table 5. Distribution of Major Coal Producers' Output by Company Type, 1976, 1986, and 1991**

Company Type	1976		1986		1991	
	Number of Firms	Percent of Majors' Total Production	Number of Firms	Percent of Majors' Total Production	Number of Firms	Percent of Majors' Total Production
Coal .....	11	34.7	12	26.6	12	17.3
Oil and Gas .....	9	32.2	21	43.9	14	31.3
Utility .....	5	10.8	8	14.9	10	14.5
Steel .....	3	8.5	5	4.5	2	3.4
Other .....	6	13.8	6	10.1	11	33.4

Note: Major coal producers are firms producing 3 million tons or more of coal per year. Data for 1976 and 1986 exclude anthracite, which accounted for less than 1 percent of U.S. coal production in those years. Percentages may not add to 100 because of independent rounding.

Sources: **1976 and 1986:** *Keystone Coal Industry Manual* and *Keystone News Bulletin*, various issues. **1991:** Energy Information Administration, Form EIA-7A, "Coal Production Report." See Appendix Tables A1-A3.

**Figure 3. Major Coal Producers' Output Shares by Company Type, 1976, 1986, and 1991**



Note: Major coal producers (firms producing 3 million tons or more coal per year) accounted for 57 percent of U.S. coal production in 1976, 74 percent in 1986, and 77 percent in 1991. Data for 1976 and 1986 exclude anthracite, which accounted for less than 1 percent of U.S. coal production in those years. Percentages may not add to 100 because of independent rounding.

Sources: **1976 and 1986:** *Keystone Coal Industry Manual* and *Keystone News Bulletin*, various issues. **1991:** Energy Information Administration, Form EIA-7A, "Coal Production Report." See Appendix Tables A1-A3.

were major coal producers, but they accounted for only 5 percent of the majors' production. By 1991, as less coal was used for coke production and some steel companies had sold their coal interests, steel firms accounted for only 3 percent of the major coal producers' output.

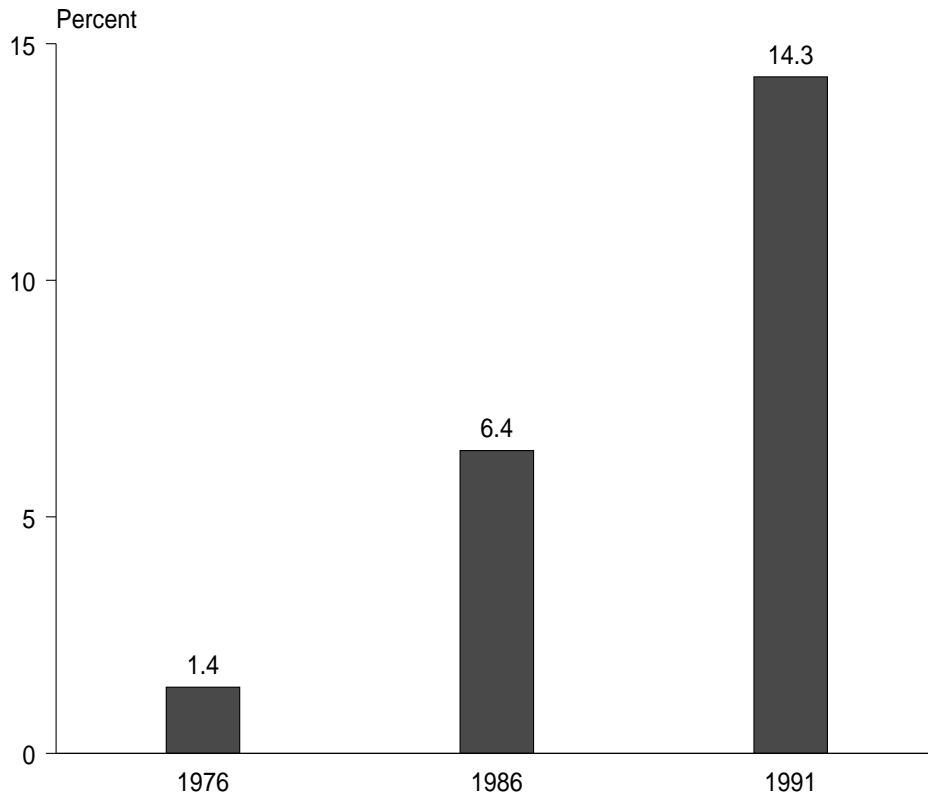
Between 1976 and 1986, firms classified in the "other" company category accounted for a declining share of the majors' output, as the production share of oil and gas companies rose substantially. In 1991, the "other" companies produced 33 percent of the major coal producers' output, compared with 10 percent in 1986. There are three principal reasons for this change. First, the Nation's two largest coal-producing companies were reclassified. Hanson's acquisition of Peabody resulted in its reclassification by EIA into the "other" company category, and Rheinbraun's acquisition of a 50-percent interest in Consolidation Coal Co. resulted in its reclassification. Second, a few other firms joined the list of "other" major coal producers. Third, the coal output of AMAX, Inc., which falls into the "other" company category, increased substantially between 1986 and 1991.

## **U.S. Coal Production by Foreign Companies**

In 1976, only one of the Nation's major coal producers—defined as a company producing 3 million tons or more of coal annually—was controlled by a foreign company, accounting for 1 percent of U.S. coal production (Figure 4 and Appendix A). In 1986, six foreign companies controlled 6 percent of U.S. coal production through U.S. subsidiaries or joint ventures. In 1991, eight of the Nation's major coal producers were controlled by foreign firms, accounting for 14 percent of U.S. coal production. Most of this increase was due to the acquisition of Peabody Holding Co., the Nation's largest coal producer, by Hanson PLC, a British firm, in 1990.

In calculating the percentages presented in the previous paragraph, control was inferred from an ownership interest of 50 percent or more. Of course, it is possible to control a company with less than a 50-percent interest. Therefore, to set an upper bound on the percentage of U.S. coal production influenced by

**Figure 4. U.S. Coal Production of Foreign-Controlled Firms as a Percentage of Total U.S. Coal Production, 1976, 1986, and 1991.**



Note: Foreign-controlled firms are U.S. coal producers with more than 50 percent of their stock or assets owned by a foreign firm. 1976 and 1986 data exclude anthracite, which accounted for less than 1 percent of U.S. coal production in those years.

Sources: **1976 and 1986:** *Keystone Coal Industry Manual* and *Keystone News Bulletin*, various issues. **1991:** Energy Information Administration, Form EIA-7A, "Coal Production Report." See Appendix Tables A1-A3.

*Diversified companies such as AMAX produced 33 percent of U.S. coal in 1991, up from 10 percent in 1986. AMAX's Belle Ayr mine produced nearly 15 million short tons of Wyoming low-sulfur coal in 1991.*

foreign companies, production data were aggregated for all foreign-affiliated U.S. coal companies, defined by the Department of Commerce as firms in which a direct foreign investor owns at least 10 percent of the voting securities.<sup>9</sup>

By this criterion, the foreign-affiliated coal producers' share of U.S. bituminous coal and lignite production<sup>10</sup> increased from 16 percent in 1986 to 24 percent in 1991, compared with 4 percent in 1980, the earliest year for which data are available. Four of the Nation's top 25 coal producers in 1991 (Peabody, Consolidation, Shell, and Ashland) were foreign-affiliated. In 1991, Rheinbraun AG, a German lignite producer and the world's second-largest coal miner,<sup>11</sup> acquired a 50-percent share of Consolidation Coal, the second-largest U.S. coal producer. However, Consolidation Coal was classified as a foreign-affiliated coal company in 1986, because about 23 percent of its parent company's (then

E.I. Du Pont de Nemour) voting stock was held by a Canadian company.<sup>12</sup> Therefore, Rheinbraun's acquisition did not affect the foreign-affiliated companies' share of U.S. coal production.

The coal industry has become increasingly international in scope. Not only have foreign companies established U.S. coal subsidiaries or joint ventures, but U.S. firms have also been investing in foreign coal development projects. Notably, Exxon is engaged in a joint venture with the government of Colombia to produce low-sulfur coal at El Cerrejon. In addition, Atlantic Richfield acquired interests in Australian coal mines and entered into a joint venture to produce low-sulfur coal in Venezuela. Mobil Oil began to develop coal reserves in Indonesia, and Cypress Minerals started development of its Australian coal reserves.<sup>13</sup> Recently, Cypress entered into a joint venture to explore for high-quality coal reserves in Venezuela.<sup>14</sup>

<sup>9</sup>Energy Information Administration, *Profiles of Foreign Direct Investment in U.S. Energy 1991*, DOE/EIA-0466(91) (Washington, DC, April 1993), p. 1.

<sup>10</sup>Bituminous coal includes subbituminous coal. Anthracite, which is not included, accounted for less than 1 percent of U.S. coal production in 1991.

<sup>11</sup>Marcia Berss, "Buy Low," *Forbes*, March 15, 1993, p. 50.

<sup>12</sup>Energy Information Administration, *Profiles of Foreign Direct Investment in U.S. Energy 1986*, DOE/EIA-0466(86) (Washington, DC, December 1987), p. 21.

<sup>13</sup>Energy Information Administration, *The Changing Structure of the U.S. Coal Industry, 1976-1986*, DOE/EIA-0513 (Washington, DC, June 1988, p. 17.

<sup>14</sup>“Cyprus Expands Foreign Contacts; Plans Coal Exploration in Venezuela,” *Coal Week*, January 6, 1992, p. 1.



## 4. Coal Production Concentration and Company Turnover

It was shown in the previous chapters that the Nation's largest mines and largest coal firms accounted for a growing proportion of U.S. coal production between 1976 and 1991, while the importance of smaller mines and independent coal producers declined. When a high percentage of total output is concentrated in the hands of a few producers, the structure of the industry becomes less competitive. The extreme case, a monopoly, results when one firm accounts for all of the industry's output. There is widespread agreement among industrial organization analysts that firms may not act as independent competitors when the largest four producers account for more than 50 percent of market sales.

Concentration ratios indicate the percentages of total industry production accounted for by the largest producers. While the 4-firm ratio (i.e., the market share of the top four producers) is the primary measure, 8-firm and 20-firm concentration ratios may also be used in analyzing the structure of an industry.

### National Coal Production Concentration

Concentration ratios are used here to indicate the direction and extent of structural change in the coal industry at the national level over the 1976-1991 period.

A detailed analysis of the degree of competition in the industry would have to define coal markets carefully. For example, there are regional coal markets, as well as markets for specific types of coal, such as metallurgical coal and low-sulfur steam coal. In addition, production concentration is only one factor affecting competition. Other factors, such as the ease with which new firms could enter the industry if existing firms made supra-competitive profits, are also important.<sup>15</sup>

The share of U.S. coal production accounted for by the top four producers rose from 20 percent in 1986 to 22 percent in 1991, but it was still below its 1976 level of 25 percent (Table 6). Similarly, the eight-firm concentration ratio rose between 1986 and 1991, but it was still below its 1976 level of 34 percent. These concentration levels are low, relative to those of most other major U.S. industries.

Looking at changes in coal production concentration ratios over a longer time frame, it can be seen that they varied—usually slightly—from year to year (Figure 5, Table 7). Many of these changes were due to coal miner strikes. Since the largest two coal companies (Peabody Coal and Consolidation Coal) are heavily unionized, strikes had a disproportionate impact on their production, thereby reducing the four-firm concentration

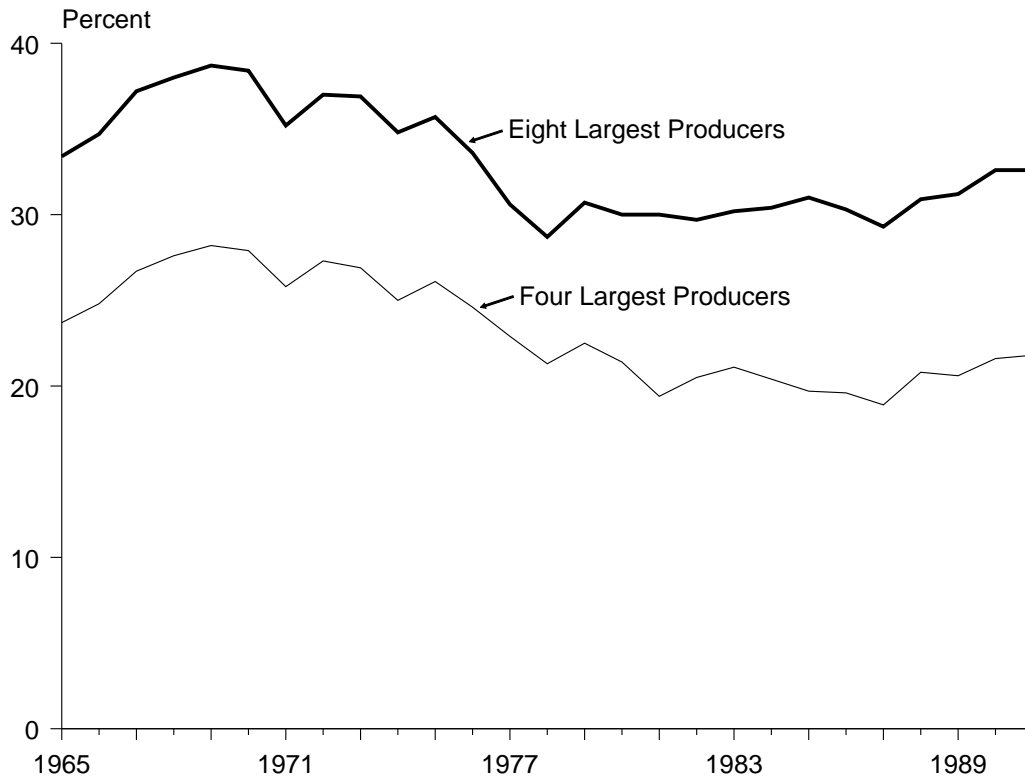
**Table 6. U.S. Coal Production Concentration, 1976, 1986, and 1991**

Producer Group	Share of Total U.S. Coal Production (Percent)		
	1976	1986	1991
Four Largest Producers . . . . .	24.6	19.6	21.8
Eight Largest Producers . . . . .	33.6	30.3	32.6
Twenty Largest Producers . . . . .	48.7	51.1	54.5

Note: 1976 and 1986 data exclude anthracite, which accounted for less than 1 percent of U.S. coal production those years. Sources: *Company Production*: Appendix Tables A1-A3. *Total Production*: Energy Information Administration, *Coal Production 1991*, DOE/EIA-0118(91) (Washington, DC, October 1992), Table 1, and *Annual Energy Review*, DOE/EIA-0384(91) (Washington, DC, June 1992), Table 84.

<sup>15</sup>Comprehensive analyses of competition in the U.S. coal industry include: U.S. Department of Justice, *Competition in the Coal Industry* (Washington, DC, May 1978 and April 1983); U.S. Department of Energy, *Coal Competition: Prospects for the 1980's*, DOE/CP-0003-1 (Washington, DC, July 1982); Federal Trade Commission, *The Structure of the Nation's Coal Industry, 1964-1974* (Washington, DC, November 1978); and U.S. General Accounting Office, *The State of Competition in the Coal Industry* (Washington, DC, December 1977).

**Figure 5. U.S. Coal Production Concentration, 1965-1991.**



Note: Anthracite is excluded in all years except 1991, when it accounted for less than 1 percent of total U.S. coal production.

Sources: **1965-1974:** Federal Trade Commission, *The Structure of Nation's Coal Industry, 1964-1974* (Washington, DC, November 1978), p. 38. **1975-1978:** Joe G. Baker and Rachel C. Bishop, *A Statistical Profile of Major Coal-Producing Firms*, 1978 (September 1980), pp. 21 and A-15 – A-39. **1979-1984:** Calculated from *Keystone Coal Industry Manual*, various years. **1985-1990:** Calculated from *Keystone News Bulletin* and *Keystone Coal Industry Manual*, various issues. **1991:** Energy Information Administration, Form EIA-7A, "Coal Production Report."

ratio. When the major strike years (1971, 1974, 1978, and 1981) are disregarded, coal production concentration trends become clear. From 24 percent in 1965, the four-firm concentration ratio rose to a peak of 28 percent in 1969. Then, there was a long-term decline to 19 percent in 1987.

During this period of decline, concentration rose in only one year, 1983, when U.S. coal production fell because of the severe recession of the early 1980's. Apparently the largest producers were less affected by the recession than were smaller producers, perhaps because more of their coal was sold under long-term contracts.

After its low point of 19 percent in 1987, national coal production concentration rose to 22 percent in 1990 and 1991. These five years were part of a period of falling coal prices and excess production capacity in the industry. As retrenchment took place, many of the smaller coal producers left the industry, while some of the larger producers consolidated (see Chapters 2 and 3). In addition, several of the top 20 producers increased the output from their low-sulfur coal mines in the West, as electric utilities demanded more low-sulfur coal to comply with clean air regulations.

## Regional Coal Production Concentration

Within the United States, coal is traded in several regional coal markets. These markets are difficult to define, both conceptually and practically. They are also subject to change over time, as trade patterns are affected by changes in factors such as transportation costs, and by laws such as the Clean Air Act and its amendments. For example, as the demand for low-sulfur coal increased and railroad transportation rates declined, more Western coal was shipped to areas east of the Mississippi River.

This section measures changes in coal production concentration over the 1976-1991 period in three broad regions: Appalachia, the Interior Region, and the Western Region (Figure 6). Generally, these delineations are

**Table 7. U.S. Coal Production Concentration, 1965-1991**

Year	Share of U.S. Coal Production (Percent)	
	Four Largest Producers	Eight Largest Producers
1965	23.7	33.4
1966	24.8	34.7
1967	26.7	37.2
1968	27.6	38.0
1969	28.2	38.7
1970	27.9	38.4
1971	25.8	35.2
1972	27.3	37.0
1973	26.9	36.9
1974	25.0	34.8
1975	26.1	35.7
1976	24.6	33.6
1977	22.9	30.6
1978	21.3	28.7
1979	22.5	30.7
1980	21.4	30.0
1981	19.4	30.0
1982	20.5	29.7
1983	21.1	30.2
1984	20.4	30.4
1985	19.7	31.0
1986	19.6	30.3
1987	18.9	29.3
1988	20.8	30.9
1989	20.6	31.2
1990	21.6	32.6
1991	21.8	32.6

Note: Anthracite is excluded in all years except 1991, when it accounted for less than 1 percent of total U.S. coal production.

Sources: **1965-1974:** Federal Trade Commission, *The Structure of the Nation's Coal Industry, 1964-1974*, (Washington, DC, November 1978), p. 38. **1975-1978:** Joe G. Baker and Rachel C. Bishop, *A Statistical Profile of Major Coal-Producing Firms, 1978* (September 1980), pp. 21 and A-15-A-39. **1979-1984:** Calculated from *Keystone Coal Industry Manual*, various years. **1985-1990:** Calculated from *Keystone News Bulletin* and *Keystone Coal Industry Manual*, various issues. **1991:** Energy Information Administration, Form EIA-7A, "Coal Production Report."

useful for examining trends in coal production concentration, although each of the regions may contain one or more sub-markets, such as for lignite or for Central Appalachian low-sulfur coal. The regional concentration ratios measure the regional production of the region's largest producers as a percentage of the region's total coal production.

### **Appalachia**

Historically, Appalachia has been the Nation's most important source of coal. In 1991, nearly 90 percent of all U.S. coal mines were located within the region, accounting for 46 percent of total U.S. coal production (down from 60 percent in 1976).<sup>16</sup> Appalachia is the dominant supplier of coal that can be used to make coke for use in the steel industry, i.e., metallurgical or coking coal. It is also the principal source of coal for export to other countries.

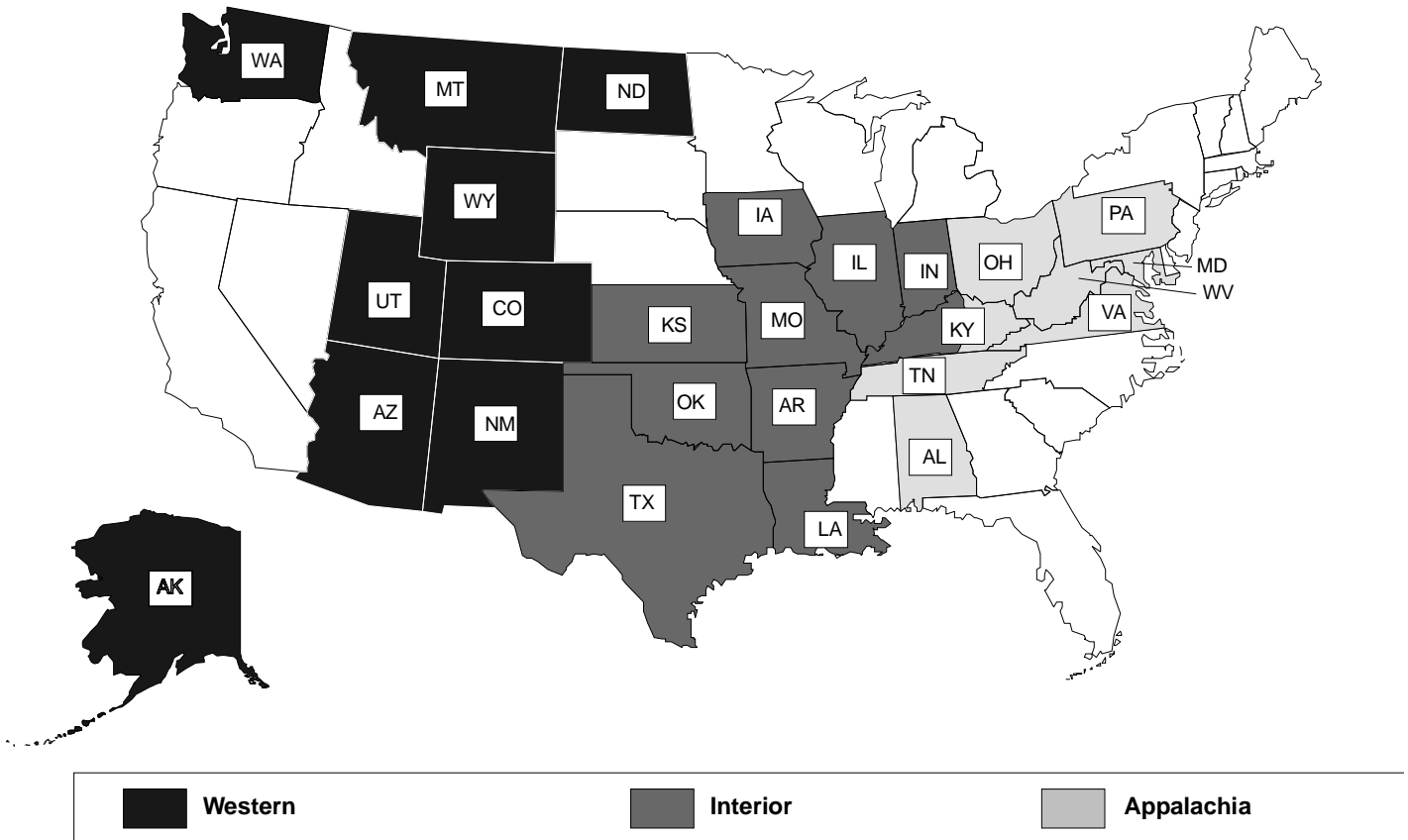
Appalachia is the Nation's most diverse coal-producing region in terms of consumer characteristics, the types of coal produced, production methods, and mine size. Its coals are predominantly bituminous, with a high Btu (heat-producing) content and a wide range of sulfur content. Central Appalachia is the primary source of high-Btu, low-sulfur coal. The Clean Air Act Amendments of 1990 are expected to increase the demand for this coal substantially. (The market for this coal is examined in Chapter 6.) Although Appalachia is known for its hundreds of small mines that open and close as coal prices rise and fall, the region also includes some of the Nation's largest coal producers.

Coal production concentration is lower in Appalachia than in any other coal-producing region (Table 8), reflecting the large number of coal producers in Appalachia. The top four producers accounted for only one-fifth of the region's coal output in 1991, about the same as in 1986 and slightly lower than the 22-percent share that prevailed in 1976. Consolidation Coal Company was the region's largest coal producer by far, mining 2.5 times as much coal as the second-largest producer and accounting for one-tenth of Appalachia's coal output in 1991 (Appendix C, Table C1).

The decline in the 4-firm and 8-firm concentration ratios between 1976 and 1986 was attributable in part to the decline in the demand for coking coal. In 1976, two of the top four coal producers in Appalachia were

<sup>16</sup>Coal production and mine data used in this chapter are from: Energy Information Administration, *Coal Production 1991*, DOE/EIA-0118(91) (Washington, DC, October 1992), Table 1; *Coal—Bituminous and Lignite in 1976*, DOE/EIA-0118/1(76) (Washington, DC, December 1978); and *Coal—Pennsylvania Anthracite in 1976*, DOE/EIA-0119(76) (Washington, DC, July 1978).

**Figure 6. U.S. Coal-Producing Regions**



Source: Energy Information Administration, Office of Coal, Nuclear, Electric and Alternate Fuels.

owned by steel companies. By 1986, the steel industry-affiliated companies had dropped out of the top four category.

The eight-firm concentration ratio was virtually the same in 1991 as in 1976. Over the same period, the market share of the 20 largest producers increased from 44 percent to 54 percent, as many smaller firms dropped out of the industry or merged with larger firms, pushing up the market share of the top 20 firms.

### ***Interior Region***

The Interior Region accounted for 20 percent of U.S. coal production in 1991, down from 24 percent in 1976. There

are two distinct coal-producing areas in the region. The Illinois Basin, including most of Illinois and parts of Indiana and western Kentucky, produces high-Btu bituminous coal with medium-to-high sulfur content. This coal is mined by both surface and underground methods. There has been a trend toward underground mining as some of the region's best surface deposits neared depletion and surface mining regulations increased surface production costs.

The second major coal-producing area in the Interior Region consists of the lignite fields along the Gulf Coastal Plain. Because this lignite lies in thick seams that are close to the surface, it can be mined at low cost. However, because of its low thermal value, high moisture content,

and combustibility, it cannot be transported economically over long distances. Generally, it is used to fuel the boilers of large minemouth power plants in Texas. This lignite accounted for virtually all of the growth in Interior Region coal production, as Texas lignite production nearly quadrupled between 1976 and 1991, while coal production from the Interior Region as a whole increased by 21 percent.

Coal production from the Interior Region—and the Illinois basin in particular—has been affected adversely by the Surface Mining Control and Reclamation Act of 1977, which reduced productivity and raised costs at surface mines, as well as by clean air legislation. The Clean Air Act Amendments of 1990 are expected to result in a significant decline in demand for the region's high-sulfur coal, although the impact will be ameliorated by State policies that encourage the installation of

**Table 8. Regional Coal Production Concentration, 1976, 1986, and 1991**

Region and Producer Group	Share of Regional Coal Production (Percent)		
	1976	1986	1991
<b>Appalachian Region</b>			
Four Largest Producers .....	21.8	19.9	20.4
Eight Largest Producers .....	31.5	30.2	31.2
Twenty Largest Producers .....	44.4	51.7	54.0
<b>Interior Region</b>			
Four Largest Producers .....	51.9	44.6	38.7
Eight Largest Producers .....	66.9	57.5	51.7
Twenty Largest Producers .....	NA	76.4	71.9
<b>Western Region</b>			
Four Largest Producers .....	42.3	35.7	37.5
Eight Largest Producers .....	65.9	59.0	60.6
Twenty Largest Producers .....	91.6	87.5	91.0

NA = Not available.

Note: 1976 and 1986 data exclude anthracite, which accounted for less than 1 percent of U.S. coal production in those years.

Sources: **1976 Company Production:** *Keystone News Bulletin* (February 28, 1977), pp. 18-24; and *1977 Keystone Coal Industry Manual*. **1976 Total Production:** Energy Information Administration, *Energy Data Report*, "Coal—Bituminous and Lignite in 1976," DOE/EIA-0118/1(76) (Washington, DC, December 18, 1978), p. 11. **1986 Company Production:** *Keystone News Bulletin* (February 27, 1987), pp. 9-12; and *1987 Keystone Coal Industry Manual*. **1986 Total Production:** Energy Information Administration, *Quarterly Coal Report*, DOE/EIA-0121(87/2Q) (Washington, DC, October 1987), pp. 81, 88. **1991 Company and Total Production:** Energy Information Administration, Form EIA-7A, "Coal Production Report."



electric power plant flue gas scrubbers to protect their coal industries.

The four-firm coal production concentration ratios are higher in the Interior Region than in any other region, with the output of each of the top four producers being substantially greater than that of the lower-ranked firms (Appendix C, Table C2). However, concentration declined significantly between 1976 and 1991. The production share of the top four firms fell from 52 percent to 39 percent, while the share of the top eight firms fell from 67 percent to 52 percent. Thus, in 1991, the top eight firms accounted for the same share of the region's production as was held by the top four firms in 1976.

Much of the decline in the Interior Region's coal production concentration was due to the falling output of Peabody Coal Company, the region's largest producer. As the coal reserves of its older mines were depleted and large, long-term utility contracts for its high-sulfur coal expired, Peabody shifted toward the production of low-sulfur coal in Appalachia and the West.

Another important factor that affected the structure of the coal industry in the Interior Region was the entry of several new coal-producing companies, particularly in the lignite fields of Texas. Most of these new entrants were electric utility subsidiaries. As the output of the new producers increased, the market share of the established producers in the Illinois Basin declined.

### ***Western Region***

Coal is produced on a large scale in the Western Region, which, in 1991, accounted for only 3 percent of U.S. coal mines, but for 34 percent of the Nation's coal output. Coal production has grown rapidly in the region, which accounted for only 16 percent of U.S. coal production in 1976 and 6 percent in 1970. Typically, the coal is mined from very thick seams (often 40 to 70 feet thick), where gigantic draglines and power shovels are used to remove the overburden and extract the coal.

*Peabody was the Nation's largest coal-producing company during the 1976-1991 period, and was a major producer in Appalachia, the Interior, and the West. This Peabody mine is in Arizona.*

Virtually all Western coal is used by electric utilities, generally at huge minemouth power plants or at power plants in the Midwest. Most coal produced in the Western Region is of subbituminous rank, which has a lower Btu content than bituminous coal. However, this disadvantage is offset, to a large extent, by the relatively low cost of mining the Western coal. The low mining cost stems from the high ratio of the coal seam thickness to the thickness of the overburden that must be removed to expose the coal. As long-distance railroad transportation costs have declined, the geographic boundaries of Western coal markets have expanded.

Most Western coal is produced from Wyoming's Powder River Basin, where the Black Thunder mine yielded nearly 31 million tons of coal in 1991, making it the Nation's largest coal mine. Another seven mines in the State produced more than 11 million tons each, making Wyoming the leader among coal-producing States.<sup>17</sup> The Powder River Basin is expected to continue as the primary source of low-sulfur coal, helping to meet the environmental quality standards set by the Clean Air Act Amendments of 1990.

Because of the large scale of mining in the Western Region, the mines and coal companies operating there

are large, and there are fewer of them than in other regions. Thus, the Western Region's 8-firm and 20-firm coal production concentration ratios are higher than those in the other coal-producing regions.

Coal production in the Western Region grew rapidly over the 1976-1986 period. Although the output of the largest firms increased substantially, it was outpaced by the entry of new companies and the growth of the smaller producers. Therefore, the region's coal production concentration ratios declined between 1976 and 1986. The production share of the top four firms fell from 42 percent to 36 percent over the 10-year period.

Coal production concentration in the Western Region increased slightly from 1986 to 1991. The output of the largest producers rose, as Peabody increased its production of low-sulfur coal, and several major oil and gas companies and electric utilities increased their coal output. While the region's total output continued to rise, it was at a much slower pace. Western Region coal production grew at an average annual rate of 5 percent between 1986 and 1991, compared with an average rate of 9 percent between 1976 and 1986.<sup>18</sup> As the region's total production grew at a slower rate than the production of the largest firms, coal production concentration

<sup>17</sup>Eugene R. Slatick, "Wyoming Coal: An Overview," in Energy Information Administration, *Coal Production 1991*, DOE/EIA-0118 (91) (Washington, DC, October 1992), Table FE3.

<sup>18</sup>Energy Information Administration, *Coal Production 1991*, DOE/EIA-0118(91) (Washington, DC, October 1992), Table B5; and *Coal—Bituminous and Lignite in 1976*, DOE/EIA-0118/1(76) (Washington, DC, December 1978), Table 8.

rose. The production share of the top four firms increased to 38 percent—still below its 1976 level.

### Turnover Among Major Coal Producers

The top three U.S. coal producers in 1976 (Peabody, Consolidation, and AMAX) maintained their ranks in 1986 and 1991, although the ownership of the first two companies changed. Among the remaining top 10 producers, there was substantial turnover (change in rank). Most of this change took place between 1976 and 1986 (Table 9). Three of the top 10 producers in 1986 and 1991 were not among the major coal companies (i.e., firms producing 3 million tons of coal or more) in 1976. All three were oil and gas companies, two of which were new not only to the top 10, but to the coal industry. Atlantic Richfield Co. and Sun Company, Inc. did not produce any coal in 1976, yet they were the 6th-largest and 10th-largest coal producers, respectively, in 1986.

In addition, Texas Utilities Company rose from 20th to 4th in rank in 1986, illustrating the increasing partici-

pation of electric utilities in the coal industry. The list of the top 10 producers in 1976 that were not among the top 10 in 1986 and 1991 (Table 9) illustrates the decline of steel company participation in the coal industry. U.S. Steel fell from the 6th-largest producer in 1976 to 26th in 1986. Bethlehem Steel fell from 7th to 23rd in rank over the same period.

The changes in coal company production rankings were much less dramatic between 1986 and 1991 than between 1976 and 1986, with a few exceptions: Pittston fell from 15th to 26th in rank, and Island Creek fell from 12th to 17th. In general, the Western producers, particularly the major oil companies, moved up in rank.<sup>19</sup> Texas Utilities fell from fourth to eighth in rank. This was partly because its production of coal owned by the Aluminum Company of America (Alcoa) to produce electricity for use by Alcoa was attributed to Alcoa in 1991, while it was attributed to Texas Utilities in the data sources used for previous years. If the coal production for the Alcoa plant were included in Texas Utilities' 1991 production, it would be sixth, instead of eighth, in rank in 1991.

**Table 9. Turnover Among Major U.S. Coal Producers, 1976-1991**

Company	1991 Rank	1986 Rank	1976 Rank
<b>Top Producers in 1991</b>			
Peabody Holding Company, Inc. (Hanson) . . . . .	1	1	1
Consolidation Coal Co. . . . .	2	2	2
AMAX, Inc. . . . .	3	3	3
Atlantic Richfield Co. . . . .	4	6	--
Exxon Corp. . . . .	5	5	--
PacifiCorp . . . . .	6	9	9
Sun Company, Inc. . . . .	7	10	--
Texas Utilities Co. . . . .	8	4	20
Montana Power Co. . . . .	9	11	13
North American Coal Corp. . . . .	10	7	9
<b>Top 10 Producers in 1976 Not Among the Top 10 in 1986 and 1991</b>			
Occidental Petroleum Corp. (Island Creek Corp.) . . . .	17	12	4
Pittston Co. . . . .	26	15	5
United States Steel Corp. . . . .	28	26	6
Bethlehem Steel Co. . . . .	24	23	7
Arch Mineral Corp. . . . .	14	16	8

-- = Not a major producer in 1976.

Sources: **1976 and 1986:** *Keystone Coal Industry Manual* and *Keystone News Bulletin*, various issues. **1991:** Energy Information Administration, Form EIA-7A, "Coal Production Report." See Appendix Tables A1-A3.

## 5. Coal Reserves Concentration and Federal Coal Leasing

### Coal Reserves Ownership Concentration

Coal reserves concentration ratios indicate the extent to which the Nation's coal reserves are controlled by a limited number of companies—customarily the largest 4, 8, and 20 reserve holders. Access to suitable reserves is essential for coal production, and there are markets for reserves, just as there are markets for the coal that is produced from developed reserves. The market for coal reserves is particularly important in the Western United States, where electric utilities typically buy large blocks of reserves to be mined by their own coal-producing subsidiaries, or enter into long-term contracts with coal producers that own suitable reserves, instead of shopping among coal producers for periodic coal supplies.

The concentration of coal reserves ownership is lower than coal production concentration, and it did not change significantly between 1976 and 1985 (Table 10). The four largest reserve holders controlled 10 percent

of the Nation's demonstrated coal reserves in both years. Two of the top four reserve holders were railroad companies, which were not coal producers. It is important to note that, although the Federal Government is by far the largest owner of coal reserves in the United States—holding about one-third of the total reserves—it is excluded from the top reserve holders in the calculations, which include only private companies.

The concentration ratios shown in Table 10 are based upon the U.S. demonstrated reserve base (DRB). The DRB includes all measured and indicated coal resources that could be mined commercially at the time of the reserve estimate.<sup>20</sup> However, much of the coal cannot be recovered because it is inaccessible, off limits because of land use planning, must be left in place to support existing structures, or would be lost in mining. Generally, about 57 percent of the DRB is thought to be recoverable, although the percentage varies according to geographic region and mining method.<sup>21</sup>

**Table 10. U.S. Coal Reserves Ownership Concentration, 1976, 1985, and 1990**

Group	Share of Total U.S. Demonstrated Coal Reserves (Percent)		
	1976	1985	1990
Four Largest Reserve Holders .....	10.0	10.0	7.2
Eight Largest Reserve Holders .....	15.0	15.9	9.3
Twenty Largest Reserve Holders .....	20.1	22.8	13.4

Sources: **1976 Company Reserves:** 1977 *Keystone Coal Industry Manual*, p. 770. **1976 U.S. Reserves:** Energy Information Administration, *Energy Data Report*, "Coal—Bituminous and Lignite in 1976," DOE/EIA-0118/1(76) (Washington, DC, December 18, 1978), p. 7. **1985 Company Reserves:** 1986 *Keystone Coal Industry Manual*, p. 668. **1985 U.S. Reserves:** Energy Information Administration, *Coal Production 1986*, DOE/EIA-0118(86) (Washington, DC, January 1988), p. 85. **1990 Company Reserves:** Appendix Table B1. **1990 U.S. Reserves:** Energy Information Administration, *Coal Production 1990*, DOE/EIA-0118(90) (Washington, DC, September 1991), Table A1.

The coal reserve concentration ratios should be viewed with a great deal of caution. The company data do not always correspond with the DRB criteria. They are based on unofficial surveys and reports, and different companies may use different criteria for measuring their reserves. In particular, some estimates may include only the recoverable portion of the reserves. Some companies may also change their criteria from one year to another. Also, some company reserve estimates may include Canadian reserve holdings.

Assuming that each company used the same criteria for estimating its coal reserves in each year, the concentration ratios shown in Table 10 probably would be reliable indicators of how coal reserves concentration changed at the national level between 1976 and 1985. However, although railroads in the West own substantial coal reserves, the coverage of railroads in the coal reserve data is not consistent from year to year. Some railroads are included in one year but not in other years.

To circumvent this problem, the concentration of reserve ownership among coal producers, excluding the railroads, was calculated for 1985 and 1990. In this case, the top four reserve holders accounted for 7 percent of the U.S. DRB in 1990, down from 9 percent in 1985; the top eight held 9 percent of the reserves in 1990, down from 14 percent in 1985; and the top 20 held 13 percent of the reserves in 1990, down from 20 percent in 1985.

Although these concentration ratios are far from precise and are not reliable indicators of the magnitude of changes, two tentative conclusions may be drawn from them:

- (1) U.S. coal reserves ownership concentration is low (compared to coal production concentration and market sales concentration in other industries),
- (2) U.S. coal reserves ownership concentration declined between 1985 and 1990.

This decline in the share of the Nation's coal reserves held by the largest reserve holders is consistent with the observation that some of the largest reserve holders have depleted or sold much of their coal reserves and relinquished many of their Federal coal leases.

## **Federal Coal Reserves and Leasing**

The Federal Government owns about one-third of the Nation's coal resources, located principally in the West.<sup>22</sup> About 60 percent of western coal reserves are located on Federal lands. An additional 20 percent are managed or impacted by the Federal Government, because of trust responsibilities for Indian lands or the commingling of Federal with State and private coal reserves. In 1991, 253 million tons of coal produced on

Federal lands were sold, accounting for 25 percent of U.S. coal production—up from 2 percent in 1970 and 11 percent in 1980.<sup>23</sup>

In 1991, about \$277 million in royalties was collected from leases on Federal coal lands. The top four royalty

payers accounted for 34 percent of the total coal royalties collected, and the top eight payers accounted for 54 percent of the total.<sup>24</sup> This indicates that the leasing of Federal coal reserves and coal production from Federal lands are not highly concentrated among a few companies.

<sup>23</sup>U.S. Department of the Interior, Minerals Management Service, *Mineral Revenues 1991*, p. 63 and Energy Information Administration, *The U.S. Coal Industry, 1970-1990: Two Decades of Change*, DOE/EIA-0559 (Washington, DC, November 1992), p. 14.

<sup>24</sup>U.S. Department of the Interior, Minerals Management Service, *Mineral Revenues 1991*, p. 63; and letter dated January 15, 1993.



## 6. Recent Developments and Concerns

Since the enactment of the Clean Air Act Amendments of 1990, there has been increased concern about the availability of low-sulfur coal and the competitiveness of low-sulfur coal markets. In addition, as coal industry mergers and acquisitions have continued unabated, since 1991, the structure of the industry today may be significantly different from its structure as of 1991. These issues are addressed in this chapter.

### The Structure of Low-Sulfur Coal Markets

It is widely recognized that the Clean Air Act Amendments of 1990 (CAAA) will increase the demand for low-sulfur coal to meet the restrictions on sulfur dioxide emissions from electric utility power plants. However, there is much uncertainty—and therefore disagreement—on the extent of the increased demand and its effect on future low-sulfur coal prices.

There are two major low-sulfur coal regions in the United States: the Powder River Basin of Wyoming

and the coalfields of Central Appalachia, primarily in southern West Virginia and eastern Kentucky. There is little likelihood that the increased demand for low-sulfur coal will lead to sharp increases in low-sulfur coal prices at mines in the West, where there are vast reserves of low-sulfur coal that can be mined at low cost. Generally, as shown in Chapter 4, Western coal production is not highly concentrated—that is, the largest producers do not account for a large share of the market. Also, as shown in Chapter 5, the Federal Government owns 60 percent of the coal reserves in the West, and its leasing policies could influence concentration levels in that region.

The coal reserves of Central Appalachia are more limited, and the demand for coal from that area is more intense, since it has a high Btu content and is closer to most U.S. coal consumers and coal ports. Central Appalachian low-sulfur coal demand and prices rose dramatically after the institution of the New Source Performance Standards in 1971, which placed strict limits on the emission of sulfur dioxide from new

power plants. Coals that met the emissions limit of 1.2 pounds of sulfur dioxide per million Btu were called “compliance” coals. The steep coal price increases of the 1970's in Central Appalachia were largely limited to compliance coals, and they were temporary. Prices came down in the 1980's, as production capacity was expanded and the demand for compliance coals eased.

(Appendix Tables C-1 and C-4). Central Appalachia's coal production concentration is considerably lower than that of the Interior and

The effects of the CAAA on Central Appalachian coal prices may be less pronounced, for the following reasons:

- The CAAA provisions allow several options for meeting emissions limits. In particular, utilities could burn “near-compliance” coals that emit between 1.2 and 2.0 pounds of sulfur dioxide per million Btu and buy emissions allowances to cover the excess emissions. Coals within this sulfur content range are plentiful, and utilities are expected to increase their use of coal mixtures that blend coals of different qualities.
- States with extensive high-sulfur coal reserves have protected their coal industries by requiring their electric utilities to install flue gas scrubbers, reducing the demand for low-sulfur coal.
- Several coal producers are increasing their low-sulfur coal production capacity in Central Appalachia.
- Western low-sulfur coal is expected to make greater inroads into Midwestern and Southern coal markets, easing the demand pressure on Central Appalachian coal.

Most Eastern low-sulfur coal reserves lie within southern West Virginia and eastern Kentucky. EIA data indicate that coal production from this area is not highly concentrated (Table 11). In 1991, the top four producers accounted for less than 19 percent of the region's output.

In general, 1991 coal production concentration in this low-sulfur coal production region was similar to that for Appalachia as a whole. Peabody Holding Co., A.T. Massey Coal Co., and Ashland Coal, Inc. were among the top producers in both regions. However, Consolidation Coal Co., by far the largest producer in Appalachia, was only the ninth-largest producer in Central Appalachia

**Table 11. Central Appalachian Coal Production Concentration, 1991**

<b>Producer Group</b>	<b>Production Share (Percent)</b>
Four Largest Producers . . . . .	18.8
Eight Largest Producers . . . . .	31.6
Twenty Largest Producers . . . .	56.7

Source: Energy Information Administration, Form EIA-7A, "Coal Production Report."

Western regions, because numerous coal producers operate in the region, serving diverse markets including electric utilities, exporters, coke plants, and other industries.

### Potential Impacts of Recent Developments

The latest year for which comprehensive coal production data are available is 1991. However, the wave of coal industry mergers has continued into 1992 and 1993 (Table 12). The impacts of those mergers on the structure of the industry have been estimated for this report by applying the new ownership patterns to the 1991 data base. This gives only a rough idea of the industry's current structure, since it captures only the major changes in coal company ownership, not the changes in company coal production since 1991.

The recent mergers increased the estimated market share of the top four coal producers in the United States and in various regions (Table 13). The absolute impact of the mergers was greatest in the Western Region, changing the production share of the top four firms from 38 percent in 1991 to an estimated 46 percent currently. The relative impact was greatest in Appalachia, where the market share of the top four producers increased from 20 percent to an estimated 26 percent—a percentage change of 30 percent.

When the post-1991 ownership changes were incorporated, the foreign-controlled major coal producers accounted for an estimated 16 percent of U.S. coal production, compared with 14 percent in 1991. The major acquisitions of Britain's RTZ Corp. and Hanson's acquisition of the Santa Fe Pacific Coal Corp. were partly offset by Zeigler's purchase of Royal Dutch Shell's U.S. coal mines. Zeigler is an independent coal company, one of the few large independents that have expanded in

recent years. Therefore, its acquisition of Shell's coal assets raised the independent coal companies' estimated current share of the major coal producers' output, relative to their 1991 share.

**Table 12. Recent Coal Industry Mergers**

Year	Acquiring Company	Acquired Company
1992	Arch Mineral Corp. Ashland Coal, Inc. Man Valley Steel, Inc. Marlon Mining Corp. Pittston Coal Co. Quaker Coal Co. Schulties, Charles W. Tribel, Inc. West Virginia Resources Zeigler Coal Holding Co.	Shrewsbury Coal Co. Dal-Tex Coal Corp. Tunnelton Mining Co. Southern Illinois Mining Kanawha Land Co. Sunnyside Kentucky, Inc. Buck Creek Mining Co. Laurel Mines Corp. Oneida Coal Co. Shell Mining Co.
1993	Consolidation Coal Co. Cyprus Minerals Co. Hanson PLC RTZ Corp. (Kennecott) RTZ Corp. (Kennecott)	Island Creek Coal Co. AMAX, Inc. Santa Fe Pacific Coal NERCO Cordero Mining Co.

Note: Includes mergers that were announced up to June 15, 1993.

Sources: *Mergers and Acquisitions in the U.S. Coal Industry 1990-1992* (Boulder, CO: Resource Data International, Inc., 1993), Table 2; and various coal trade journals.

**Table 13. Structural Elements of the U.S. Coal Industry: Historical Data and Current Estimates**

Structural Element	1976	1986	1991	Estimated Current <sup>a</sup>
Market Share of the Top Four Coal Producers (Percent)				
United States .....	24.6	19.6	21.8	26.5
Appalachia .....	21.8	19.9	20.4	26.2
Interior Region .....	51.9	44.6	38.7	39.4
Western Region .....	42.3	35.7	37.5	45.5
Central Appalachia .....	NA	NA	18.8	23.7
Foreign-Controlled Coal Producers' Share of U.S. Coal Production (Percent) .....				
	1.4	6.4	14.3	15.6
Share of Major Coal Producers' Output by Company <sup>b</sup>				
Type (Percent)				
Coal .....	34.7	26.6	17.3	20.3
Oil and Gas .....	32.2	43.9	31.3	24.5
Utility .....	10.8	14.9	14.5	10.5
Steel .....	8.5	4.5	3.4	3.5
Other .....	13.8	10.1	33.4	41.1

<sup>a</sup>Estimated by applying the coal company ownership as of June 15, 1993, to the 1991 coal production data base.

<sup>b</sup>Major coal producers are firms producing 3 million short tons or more of coal per year.

NA = Not available.

Note: Data for 1976 and 1986 exclude anthracite, which accounted for less than 1 percent of U.S. coal production in those years.

Percentages may not add to 100 because of independent rounding.

Sources: Appendix A, Tables A1-A3, Energy Information Administration, Form EIA-7A, "Coal Production Report"; and *1992 Keystone Coal Industry Manual* (Chicago: Maclean Hunter Publishing Co., 1992).

The recent sale of Shell's coal mines, as well as Sun's sale of its Oneida Coal Company and Cordero Mining Company, caused the estimated current coal production share of oil and gas companies to fall well below their 1991 share. The recent mergers also had a significant effect on the production share of the electric utilities, due to the acquisition of NERCO, Inc. (a utility subsidiary) by the Kennecott Corp. (a subsidiary of RTZ Corp.).

Primarily because of the acquisition of NERCO, Inc. and Cordero Mining Co. by RTZ, a highly diversified British company, the "other" company group accounted for an estimated 41 percent of the major coal producers' output, adjusted for recent mergers. This compares with the actual 1991 share of 33 percent.

When the impacts of the post-1991 mergers are used to estimate the current structure of the coal industry, the following trends become evident:

- Coal production concentration, i.e., the production share of the largest four producers, declined between 1976 and 1986 nationally and in the various coal-producing regions, as many new firms entered the industry. However, coal production concentration, as estimated, currently surpasses its 1976 level (except in the Interior Region), as many small producers left the industry and several larger firms consolidated.
- The share of U.S. coal production accounted for by foreign-controlled companies rose from 1 percent in 1976 to an estimated 16 percent currently.

- Of the major coal companies' production, the share of independent coal firms fell from 35 percent in 1976 to an estimated 20 percent currently. The steel companies' share fell from 9 percent to an estimated 4 percent over the same period.
- The coal production share of oil and gas companies rose from 32 percent in 1976 to 44 percent in 1986, and then fell to an estimated 25 percent currently as several major oil companies sold their coal assets. The production share of electric utilities also rose, then fell.
- The coal production share of other companies, primarily conglomerates, fell from 14 percent in 1976 to 10 percent in 1986. Then, largely due to the acquisition of major U.S. coal producers by British conglomerates and Rheinbraun's joint ownership of Consolidation Coal, it rose to an estimated current share of 41 percent.

The impacts of the recent mergers on coal reserves ownership concentration were not estimated, primarily because the available data on the ownership of U.S. coal reserves are not very reliable. However, one recent transfer of coal reserves should be noted because of its magnitude. In 1992, Burlington Resources, by far the largest private holder of U.S. coal reserves, sold nearly all of its reserves to Great Northern Properties Limited Partnership, a coal and timber company based in Huntington, West Virginia. Most of the approximately 14 billion tons of transferred reserves lie within Western lands owned by Burlington Northern, Inc., which spun off its non-transportation operations into Burlington Resources in 1988.<sup>25</sup>

Appendix A

**Major U.S. Coal  
Producers, 1976,  
1986, and 1991**

**Table A1. Major U.S. Coal Producers, 1976**

Rank	Coal Company	1976 Bituminous Coal and Lignite Production (Thousand Short Tons)	Controlling Company	
			Name	Type
1	Peabody Coal Co.	70,542	Peabody Holding Co. <sup>a</sup>	Coal
2	Consolidation Coal Co.	55,888	Continental Oil Co.	Oil and Gas
3	AMAX Coal Co.	23,061	AMAX, Inc.	Other
4	Island Creek Coal Co.	17,606	Occidental Petroleum Corp.	Oil and Gas
5	Pittston Co.	17,102	(independent)	Coal
6	U.S. Steel Corp.	15,982	United States Steel Corp.	Steel
7	Bethlehem Mines Corp.	14,055	Bethlehem Steel Corp.	Steel
8	Arch Mineral Corp.	13,600	Ashland Oil Co. Hunt Petroleum Corp. Hunt Industries	Oil and Gas
9	Pacific Power & Light Properties	12,146	Pacific Power & Light Co.	Utility
10	North American Coal Corp.	10,680	(independent)	Coal
11	Central Ohio Coal Co., Others	10,504	American Electric Power	Utility
12	Old Ben Coal Co.	9,715	British Petroleum, Inc. <sup>b</sup> (through Standard Oil Co. of Ohio)	Oil and Gas
13	Western Energy Co.	9,265	Montana Power Co.	Utility
14	Westmoreland Coal Co.	8,100	Westmoreland Coal Co. Penn-Virginia Corp.	Utility
15	Decker Coal Co., Rosebud Coal Sales Co., Big Horn Coal Co.	8,038	Peter Kiewit Sons Co.	Other
16	Eastern Associated Coal Corp.	7,959	Eastern Gas & Fuel Assoc.	Oil and Gas
17	Pittsburg & Midway Coal Mining Co.	7,924	Gulf Oil Co.	Oil and Gas
18	Utah International, Inc.	6,465	General Electric Co.	Other
19	Freeman United Coal Mining Co.	6,126	General Dynamics Corp.	Other
20	Industrial Generating Co.	6,000	Texas Utilities Co.	Utility
21	Rochester & Pittsburgh Coal Co.	5,798	(independent)	Coal
22	Falcon Coal Co., Inc.	5,194	Falcon Seaboard, Inc.	Other
23	Zeigler Coal Co. Empire Energy Corp.	5,176	Houston Natural Gas Corp.	Oil and Gas
24	C&K Coal Co., and Other	5,031	Gulf Resources & Chemical Corp.	Other
25	Jewell Coal and Coke Co. Shamrock Coal Co. Cumberland Collieries, Inc.	4,366	Jewell Coal & Coke Co.	Coal
26	Alabama By-Products Corp.	4,247	(independent)	Coal
27	Kemmerer Coal Co.	4,122	Lincoln Corp.	Coal
28	Knife River Coal Mining Co.	4,109	Montana Dakota Utilities Co.	Utility
29	Westmoreland Resources, Inc.	4,084	Westmoreland Coal Penn-Virginia Corp. Morrison-Knudsen Co. Kawane Industries, Inc.	Coal



**Table A1. Major U.S. Coal Producers, 1976 (Continued)**

Rank	Coal Company	1976 Bituminous Coal and Lignite Production (Thousand Short Tons)	Controlling Company	
			Name	Type

See footnotes at end of table.

**Table A1. Major U.S. Coal Producers, 1976 (Continued)**

Rank	Coal Company	1976 Bituminous Coal and Lignite Production (Thousand Short Tons)	Controlling Company	
			Name	Type
30	Martiki Coal Corp. Webster County Coal Corp. Pontiki Coal Corp.	3,916	MAPCO, Inc.	Oil and Gas
31	Valley Camp Coal Co. Valley Camp of Utah, Inc.	3,617	Quaker State Oil Refining Corp.	Oil and Gas
32	Republic Steel Corp.	3,228	Republic Steel Corp.	Steel
33	H.E. Drummond Coal Div.	3,193	The Drummond Co.	Coal
34	Energy Fuels Corp.	3,007	(independent)	Coal

<sup>a</sup>Owned by Newmont Mining Co. (27.5 percent), Williams Cos. (27.5 percent), Bechtel Corp. (15 percent), Boeing Co. (15 percent), Fluor Corp. (10 percent), and Equitable Life Assurance Society (5 percent).

<sup>b</sup>Foreign company.

Sources: *Keystone News Bulletin* (February 28, 1977), pp. 18-24; *1977 Keystone Coal Industry Manual* (New York: McGraw Hill, 1977); and Joe G. Baker and Rachel C. Bishop, *A Statistical Profile of Major Coal-Producing Firms, 1978* (September 1980), pp. A-23—A31. Some companies have been reclassified.

**Table A2. Major U.S. Coal Producers, 1986**

Rank	Coal Company	1986 Bituminous Coal and Lignite Production (Thousand Short Tons)	Controlling Company	
			Name	Type
1	Peabody Coal Co.	66,700	Peabody Holding Co. <sup>a</sup>	Coal
2	Consolidation Coal Co.	41,529	E.I. Du Pont de Nemours	Oil and Gas
3	AMAX Coal Co.	35,421	AMAX, Inc.	Other
4	Texas Utilities Mining Co.	29,717	Texas Utilities Co.	Utility
5	Exxon Coal and Minerals Co.	24,200	Exxon Corp.	Oil and Gas
6	ARCO Coal Co.	24,000	Atlantic Richfield Co.	Oil and Gas
7	North American Coal Corp.	23,956	NACCO Industries, Inc.	Coal
8	A.T. Massey Coal Co., Inc.	23,229	Fluor Corp. Royal Dutch Shell <sup>b</sup>	Oil and Gas
9	NERCO	23,200	PacifiCorp	Utility
10	Elk River Resources, Inc.	19,847	Sun Company, Inc.	Oil and Gas
11	Western Energy Co.	16,430	Montana Power Co.	Utility
12	Island Creek Corp.	16,100	Occidental Petroleum Corp.	Oil and Gas
13	Kerr-McGee Coal Corp.	15,500	Kerr-McGee Corp.	Oil and Gas
14	Old Ben Coal Co.	15,220	British Petroleum, Inc. <sup>b</sup> (through Standard Oil Co. of Ohio)	Oil and Gas
15	Pittston Co.	14,426	(independent)	Coal
16	Arch Mineral Corp.	13,100	Ashland Oil Co. Hunt Petroleum Corp. Hunt Industries	Oil and Gas
17	Pittsburg & Midway Coal Mining Co.	12,784	Chevron Corp.	Oil and Gas
18	BHP-Utah Minerals International	12,767	The Broken Hill	Oil and Gas
19	Cyprus Coal Co.	12,696	Cyprus Minerals Corp.	Coal
20	Eastern Associated Coal Co.	12,395	Eastern Gas & Fuel Associates	Oil and Gas
21	Central Ohio Coal Co., and Others	11,673	American Electric Power Service Co.	Utility
22	Kiewit Mining Group, Inc.	11,206	Peter Kiewit Sons Co.	Other
23	Beth Energy Mines, Inc.	10,360	Bethlehem Steel Co.	Steel
24	MAPCO Coal Inc.	9,860	MAPCO Inc.	Oil and Gas
25	Westmoreland Coal Co.	9,840	Westmoreland Coal Co. Penn Virginia Corp.	Coal
26	U.S. Steel Mining Co., Inc.	9,409	U.S. Steel Corp.	Steel
27	Rochester & Pittsburgh Coal Co.	8,948	(independent)	Coal
28	Drummond Co., Inc.	8,896	(independent)	Coal
29	Shell Mining Co.	8,738	Royal Dutch Shell <sup>b</sup>	Oil and Gas
30	United Coal Cos.	8,205	(independent)	Coal
31	Transco Coal Services Co.	8,030	Transco Energy Co.	Oil and Gas
32	Amherst Coal Co., and Others	8,016	Diamond Shamrock Corp.	Oil and Gas
33	Jim Walter Resources, Inc.	7,974	Jim Walter Corp.	Other
34	Coastal Coal Intl., Inc.	7,984	Coastal Corp.	Oil and Gas
35	Jno. McCall Coal Co., Inc.	7,466	(independent)	Coal

**Table A2. Major U.S. Coal Producers, 1986 (Continued)**

Rank	Coal Company	1986 Bituminous Coal and Lignite Production (Thousand Short Tons)	Controlling Company	
			Name	Type
36	Pyro Mining Co.	5,574	Pyro Energy Corp. Costain Holdings Ltd. <sup>b</sup>	Coal

See footnotes at end of table.

**Table A2. Major U.S. Coal Producers, 1986 (Continued)**

Rank	Coal Company	1986 Bituminous Coal and Lignite Production (Thousand Short Tons)	Controlling Company	
			Name	Type
37	Freeman-United Coal Mining Co.	5,124	General Dynamics Corp.	Other
38	Knife River Coal Mining Co.	4,647	Montana Dakota Utilities Co.	Utility
39	Washington Irrigation and Development Co.	4,609	Pacific Power & Light Washington Water Power (independent)	Utility Coal
40	Black Beauty Coal Co., Inc.	4,272	Utah Power & Light Co.	Utility
41	Utah Power & Light Mining	4,060	Mobil Corp.	Oil and Gas
42	Mobil Coal Producing, Inc.	3,990	Moore-McCormack Resources, Inc.	Other
43	Pickands Mather & Co.	3,484	Algoma Steel Corp., Ltd. <sup>b</sup> (independent)	Steel
44	Cannelton Industries, Inc.	3,411	Occidental Petroleum Corp. Ente Nazionale Idrocarburi <sup>b</sup>	Coal Oil and Gas
45	Baukol-Noonan, Inc.	3,379	Ashland Oil Co.	Oil and Gas
46	Enoxy Coal, Inc.	3,377	Kaiser Steel Corp.	Steel
47	Ashland Coal Co.	3,269	Quaker State Oil Refining Corp.	Oil and Gas
48	Kaiser Coal Corp.	3,234	W.R. Grace Co. Hanna Mining Co.	Other
49	Valley Camp Coal Co. Valley Camp of Utah, Inc.	3,152	Inland Steel Co.	Steel
50	Colowyo Coal Co.	3,144	Texas Municipal Power Agency	Utility
51	Inland Steel Coal Co.	3,137		
52	Texas Municipal Power Agency	3,078		

<sup>a</sup>Owned by Newmont Mining Co. (30.735 percent), Williams Cos. (30.735 percent), Bechtel Corp. (16.75 percent), Boeing Co. (16.75 percent), and Equitable Life Assurance Society (5 percent).

<sup>b</sup>Foreign company.

Sources: *Keystone News Bulletin* (February 27, 1987), pp. 9-12; and *1987 Keystone Coal Industry Manual* (New York: McGraw Hill, 1987).

**Table A3. Major U.S. Coal Producers, 1991**

Rank	Coal Company	1991 Production (Thousand Short Tons)	Controlling Company	
			Name	Type
1	Peabody Holding Co. <sup>a</sup>	85,230	Hanson PLC	Other
2	Consolidation Coal Co. <sup>b</sup>	53,253	Du Pont/Rheinbraun AG	Other
3	AMAX Coal Industries, Inc.	46,234	AMAX, Inc.	Other
4	ARCO Coal Co.	32,322	Atlantic Richfield Co.	Oil and Gas
5	Exxon Coal and Minerals Co.	31,468	Exxon Corp.	Oil and Gas
6	NERCO Coal Corp.	29,234	PacifiCorp	Utility
7	Elk River Resources, Inc.	23,729	Sun Company, Inc.	Oil and Gas
8	Texas Utilities Mining Co.	23,475	Texas Utilities Co.	Utility
9	North American Coal Corp.	22,559	NAACO Industries, Inc.	Coal
10	Entech, Inc. (Western Energy Co., Northwestern Resources)	22,500	Montana Power Co.	Utility
11	Shell Mining Co. <sup>a</sup>	21,373	Royal Dutch Shell Petroleum Company	Oil and Gas
12	Kerr-McGee Coal Corp.	21,269	Kerr-McGee Corp.	Oil and Gas
13	Cyprus Coal Co.	17,788	Cyprus Minerals Co.	Oil and Gas
14	Arch Mineral Corp.	17,643	Ashland Oil/Hunt	Other
15	Drummond, Inc.	17,483	(independent)	Coal
16	Kiewit Mining Group, Inc.	17,112	Peter Kiewit Sons Co.	Other
17	Island Creek Coal Co.	16,089	Occidental Petroleum	Oil and Gas
18	Zeigler Coal Co.	15,457	Zeigler Coal Holding Co.	Coal
19	Mapco Coal, Inc.	14,366	MAPCO, Inc.	Oil and Gas
20	A.T. Massey Coal Co.	14,128	Fluor Corp.	Oil and Gas
21	Ashland Coal, Inc. <sup>b</sup>	13,673	(independent)	Coal
22	Pittsburg & Midway Coal Mining Co.	13,276	Chevron Corp.	Oil and Gas
23	Central Ohio Coal Co., Southern Ohio Coal Co.	12,814	American Electric Power Service	Utility
24	Beth Energy Mines, Inc.	12,621	Bethlehem Steel Corp.	Steel
25	BHP-Utah International, Inc. <sup>a</sup>	11,349	Broken Hill Proprietary Co.	Oil and Gas
26	Pittston, Co.	10,853	(independent)	Coal
27	Westmoreland Coal Co. <sup>b</sup>	10,394	(independent)	Coal
28	U.S. Steel Mining Co., Inc.	10,374	USX Corp.	Steel
29	Costain Coal, Inc. <sup>a</sup>	9,993	Costain Group PLC	Other
30	Jim Walter Resources	9,574	Walter Industries, Inc.	Other
31	Transco Coal Co.	8,711	Transco Energy Co.	Oil and Gas
32	Coastal States Energy Co.	7,726	Coastal Corp.	Oil and Gas
33	United Coal Co.	7,672	(independent)	Coal
34	Addington, Inc. Addwest Mining, Inc.	7,658	Addington Resources, Inc.	Coal
35	Rochester and Pittsburgh Coal Co.	6,513	(independent)	Coal
36	(Coal owned by Alcoa, produced by Texas Utilities)	5,577	Aluminum Company of America	Other
37	Golden Oak Mining Co.	4,785	(independent)	Coal
38	Knife River Coal Mining Co.	4,779	MDU Resources	Utility

**Table A3. Major U.S. Coal Producers, 1991 (Continued)**

Rank	Coal Company	1991 Production (Thousand Short Tons)	Controlling Company	
			Name	Type
39	Black Beauty Coal Co.	4,501	Black Beauty Resources Pittsburg & Midway	Coal
40	Trapper Mining, Inc.	4,402	Colorado Ute Electric	Utility
41	Andalex Resources, Inc. <sup>a</sup>	4,400	(independent)	Coal

See footnotes at end of table.

**Table A3. Major U.S. Coal Producers, 1991 (Continued)**

Rank	Coal Company	1991 Production (Thousand Short Tons)	Controlling Company	
			Name	Type
42	Colowyo Coal Co.	4,291	W.R. Grace Co.	Other
43	Santa Fe Pacific Coal Corp. <sup>b</sup>	4,117	Santa Fe Pacific Corp.	Other
44	Baukol-Noonan, Inc.	4,088	(independent)	Coal
45	BNI Coal, Inc.	4,065	Minnesota Power & Light Co.	Utility
46	Agip Coal, Inc. <sup>a</sup>	3,700	Ente Nazionale Idrocarburi	Oil and Gas
47	—	3,619	Texas Municipal Power Agency	Utility
48	Freeman-United Coal Mining Co.	3,619	General Dynamics Corp.	Other
49	Valley Camp Coal Co.	3,498	Quaker State Corp.	Oil and Gas
50	Pickands Mather & Co. <sup>a</sup>	3,300	Steel Company of Canada	Steel
51	—	3,076	San Miguel Electric	Utility
52	Pennsylvania Coal Resources Corp. C	3,025	Pennsylvania Power & Light	Utility
53	Great Western Coal, Inc. <sup>a</sup>	3,000	Great Western Resources, Inc.	Coal

<sup>a</sup>Foreign-controlled (more than 50 percent ownership interest by a foreign company).

<sup>b</sup>Foreign-affiliated (at least 10 percent of the voting securities owned by a foreign direct investor), but not foreign-controlled, as defined in footnote a.

Sources: Energy Information Administration, Form EIA-7A, "Coal Production Report," and *Profiles of Foreign Direct Investment in U.S. Energy, 1991*, DOE/EIA-0466(91) (Washington, DC, April 1993), Table 13; "1992 Q4/M12 Report on Independent Petroleum and Coal Companies," *EPR Quarterly Review*, p. 19.



Appendix B

**Major Holders of  
U.S. Coal Reserves,  
1990**

**Table B1. Major Holders of U.S. Coal Reserves, 1990**  
(Billion Short Tons)

<b>Holder</b>	<b>Estimated Reserves</b>
United States Government <sup>a</sup> .....	155.0
Burlington Resources .....	14.6
Peabody Holding Co., Inc. ....	8.0
Exxon Coal and Minerals Co. ....	6.4
Consolidation Coal Co. ....	5.0
The North American Coal Corp. ....	2.9
Shell Mining Co. ....	2.4
AMAX Coal Industries Inc. ....	2.3
Drummond Co., Inc. ....	2.3
Island Creek Corp. ....	2.2
Phillips Coal Co. ....	2.2
Entech Inc. ....	1.9
Arch Mineral Corp. ....	1.8
Texaco .....	1.7
Kerr-McGee Coal Corp. ....	1.6
Norfolk Southern Corp. ....	1.4
United Coal Co. ....	1.3
USX Corp. ....	1.3
BHP-Utah Minerals .....	1.2
Pittston Co. ....	1.2
American Electric Power. ....	1.2
Zeigler Coal Holding Co. ....	1.2
ARCO Coal Co. ....	1.1
Texas Utilities Mining Co. ....	1.1
Westmoreland Coal Co. ....	1.1

<sup>a</sup>U.S. Government total based on Federal ownership of 60 percent of total U.S. western coal reserves.

Note: Data compiled from a National Coal Association survey of major producers. List may not be all inclusive.

Source: National Coal Association, *Coal Data 1992 Edition* (Washington, DC, July 1992), p. IV-10.

Appendix C

**Regional Coal  
Production of Top  
20 Firms, 1991**

**Table C1. Top Coal-Producing Companies, Appalachia, 1991**

<b>Rank</b>	<b>Company</b>	<b>Production</b> (Thousand Short Tons)
1	Consolidation Coal Co.	46,854
2	Peabody Holding Co.	18,617
3	A.T. Massey Coal Co.	14,128
4	Ashland Coal, Inc.	13,673
5	Island Creek Coal Co.	13,090
6	American Electric Power Services	12,814
7	Bethlehem Steel Corp.	12,621
8	Pittston Co.	10,853
9	Shell Mining Co.	10,443
10	USX Corp.	10,374
11	MAPCO, Inc.	10,169
12	Jim Walter Resources	9,574
13	Elk River Resources, Inc.	8,926
14	Cyprus Minerals Co.	8,875
15	Transco Coal Co.	8,712
16	Arch Mineral Corp.	8,563
17	Drummond, Inc.	8,100
18	United Coal Co.	7,672
19	Addington, Inc.	6,516
20	Rochester & Pittsburgh Coal Co.	6,513
<b>All Companies (Total Appalachia Production)</b>		<b>457,808</b>

Source: Energy Information Administration, Form EIA-7A, "Coal Production Report."

**Table C2. Top Coal-Producing Companies, Interior Region, 1991**

<b>Rank</b>	<b>Company</b>	<b>Production (Thousand Short Tons)</b>
1	Peabody Holding Co.	26,262
2	Texas Utilities Co.	23,475
3	Zeigler Coal Holding Co.	13,975
4	AMAX Coal Industries, Inc.	11,891
5	Costain Coal Co.	7,173
6	Arch Mineral Corp.	6,415
7	Consolidation Coal Co.	6,298
8	Aluminum Co. of America	5,577
9	Black Beauty Coal Co.	4,501
10	Exxon Corp.	4,434
11	MAPCO, Inc.	4,196
12	Texas Municipal Power Agency	3,619
13	General Dynamics Corp.	3,619
14	Kerr-McGee Corp.	3,525
15	North American Coal Corp.	3,276
16	San Miguel Electric Cooperative, Inc.	3,076
17	Island Creek Coal Co.	2,999
18	Green Coal Co., Inc.	2,174
19	Sextet Mining Corp.	2,012
20	Associated Electric Co-op, Inc.	1,942
<b>All Companies (Total Interior Production)</b>		<b>195,418</b>

Source: Energy Information Administration, Form EIA-7A, "Coal Production Report."

**Table C3. Top Coal-Producing Companies, Western Region, 1991**

<b>Rank</b>	<b>Company</b>	<b>Production (Thousand Short Tons)</b>
1	Peabody Holding Co.	40,350
2	Atlantic-Richfield Co.	32,322
3	AMAX Coal Industries, Inc.	28,748
4	Exxon Corp.	27,034
5	PacifiCorp	26,765
6	North American Coal Corp.	19,283
7	Kerr-McGee Corp.	17,744
8	Kiewit Mining Group, Inc.	15,614
9	Western Energy Co.	14,965
10	Elk River Resources, Inc.	14,804
11	BHP World Minerals	11,349
12	Chevron	9,982
13	Shell Mining Co.	9,472
14	Drummond, Inc.	9,383
15	Cyprus Minerals Co.	8,913
16	Coastal States Energy Co.	7,716
17	MDU Resources	4,779
18	Colorado-Ute Electric Association	4,402
19	Santa Fe Pacific Corp.	4,117
20	Westmoreland Coal Co.	4,091
<b>All Companies (Total Western Production)</b>		<b>342,758</b>

Source: Energy Information Administration, Form EIA-7A, "Coal Production Report."

**Table C4. Top Coal-Producing Companies, Central Appalachia, 1991**

<b>Rank</b>	<b>Company</b>	<b>Production (Thousand Short Tons)</b>
1	Peabody Holding Co.	14,123
2	Ashland Coal, Inc.	13,673
3	A.T. Massey Coal Co.	13,423
4	Pittston Co.	10,853
5	Island Creek Coal Co.	9,489
6	Transco Coal Co.	8,711
7	Arch Mineral Corp.	8,563
8	Elk River Resources, Inc.	8,442
9	Consolidation Coal Co.	8,127
10	Shell Mining Co.	8,008
11	United Coal Co.	7,672
12	MAPCO, Inc.	7,550
13	Cyprus Minerals Co.	6,598
14	Westmoreland Coal Co.	6,037
15	Addington, Inc.	5,420
16	AMAX Coal Industries Co.	4,953
17	Golden Oak Mining Co.	4,785
18	USX Corp.	4,053
19	Bethlehem Steel Corp.	3,303
20	AGIP Coal USA	2,880
<b>All Companies</b> (Total Central Appalachia Production)		<b>276,498</b>

Note: Central Appalachia is defined as coal-producing districts 7 and 8.

Source: Energy Information Administration, Form EIA-7A, "Coal Production Report."