

DOCUMENT RESUME

04550 - [B0044947]

The State of Competition in the Coal Industry. FMD-78-22; B-151071. December 30, 1977. 58 pp. + 4 appendices (12 pp.).

Report to the Congress; by Elmer B. Staats, Comptroller General.

Issue Area: Energy (1600); Energy: Effect of Federal Financial Incentives, Tax Policies, and Regulatory Policies on Energy Supply (1610); Land Use Planning and Control (2300).

Contact: Energy and Minerals Div.

Budget Function: Natural Resources, Environment, and Energy (300); Natural Resources, Environment, and Energy: Energy (305); Natural Resources, Environment, and Energy: Other Natural Resources (306).

Organization Concerned: Executive Office of the President.

Congressional Relevance: Congress.

Authority: Clean Air Amendments of 1970 (42 U.S.C. 1857).

Federal Coal Leasing Amendments Act of 1975. Federal Coal Mine Health and Safety Act of 1969.

A major part of United States energy policy is the maintenance of competition in the energy sector of the economy. Monopoly power is generally presumed to exist when industrial organization has a four-firm concentration ratio of 50% or more. Estimates of concentration ratios in American manufacturing as a whole range from 38% to 40%. Findings/Conclusions: On the basis of 1976 production, the concentration ratio in the coal industry is as follows: the top 4 firms control 25%, the top 8 firms 34%, and the top 20 firms 50%. Concentration ratios since 1950 showed a trend towards an increase during the 1950's and 1960's but a decrease since 1970. A viable state of competition exists in the coal industry and, unless circumstances change, domination by any firm or group of firms is unlikely. Control of current production is shared by numerous firms and ownership of coal reserves is dispersed even more. On a nationwide basis, petroleum firms account for less than 20% of total production and even less of coal reserves. The degree of competition varies. In the Eastern market, large numbers of firms actively compete in both contract and spot sales; reserve ownership is well dispersed. In the two Western markets, however, the situation is dynamic and requires the continued vigilance by the Federal Trade Commission, the Department of Justice, and the Interior Department through its coal leasing program.
(Author/HTW)

REPORT TO THE CONGRESS

BY THE COMPTROLLER GENERAL
OF THE UNITED STATES



The State Of Competition In The Coal Industry

The state of competition in the coal industry is analyzed in this report as an indicator of the potential for domination of this industry by the petroleum industry. Under present circumstances and outlook, a viable state of competition exists in the coal industry and it is unlikely that the industry could be dominated by any firm or group of firms.

Circumstances could change, however. The situation is dynamic in Western markets and requires the continued vigilance by the Federal Trade Commission, Department of Justice, and the Interior Department through its coal leasing program.



COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

To the President of the Senate and the
Speaker of the House of Representatives

This report reviews the state of competition in the United States coal industry and the potential for domination of that industry by outside interests. Our review encompassed concentration of production and reserves, entry conditions, announced expansion plans, and the trend of coal prices.

Our main conclusion is that the United States coal industry is competitive and that domination by petroleum companies is unlikely. However, Western coal markets should be closely observed for indications of a trend toward lessened competition. Should such a trend develop, the Federal Government can, through its leasing policies, ensure the maintenance of competition in coal markets. Surveillance of energy industries by the Department of Justice is also mandated by existing law.

We made our review pursuant to the Budget and Accounting Act of 1921, 31 U.S.C. 53; the Legislative Reorganization Act of 1970, 31 U.S.C. 1154 (Supp. V, 1975); and Section 207 of the Department of Energy Organization Act, P.L. 95-91, 91 Stat. 565 (1977), to be codified at 42 U.S.C. 7137. This review was initiated at the request of James O. Eastland, Chairman, Senate Committee on the Judiciary and Senator James Abourezk.

We are sending copies of this report to the Acting Director, Office of Management and Budget, the Secretary of the Interior, the Attorney General, the Secretary of Energy, and the Chairman of the Federal Trade Commission.

A handwritten signature in black ink, appearing to read "James A. Abate".

Comptroller General
of the United States

D I G E S T

A major part of United States energy policy is the maintenance of competition in the energy sector of the economy. Such competition must exist both within and among industries in this vital sector of our economy. This report analyzes the state of competition in one energy industry, coal production, and examines the potential for outside domination of this industry, particularly by petroleum companies. The study was initiated at the request of Senator Eastland as Chairman, Committee on the Judiciary, and Senator Abourezk.

CONCLUSIONS

A viable state of competition exists in the coal industry. Unless circumstances change, domination by any firm or group of firms is unlikely.

Control of current production is shared by numerous firms and ownership of coal reserves is dispersed even more. On a nationwide basis, petroleum firms account for less than 20 percent of total production and even less of coal reserves. (See pp. II-3, II-14, and II-15).

The degree of competition varies. In the Eastern market, large numbers of firms actively compete in both contract and spot sales; reserve ownership is well dispersed. In the two Western markets, however, the situation is dynamic and requires the continued vigilance by the Federal Trade Commission and the Department of Justice as well as by the Interior Department through its coal leasing program. (See pp. III-3, III-5, III-8, III-10, and III-12).

GAO's work is the result of a detailed analysis of "concentration ratios", i.e., the percent of production and reserves controlled by the leading companies as well as other pertinent factors such as entry barriers, expansion plans, and price actions.

NATIONAL CONCENTRATION RATIOS AND
PETROLEUM FIRM PARTICIPATION

There is no universally accepted index to indicate monopoly power but there appears to be general agreement on the part of scholars on industrial organizations that a four-firm concentration ratio of 50 percent or more is required before there should be a presumption of monopoly power.

Estimates of concentration ratios in the American manufacturing sector as a whole range from 36 percent to 40 percent. On the basis of 1976 production, the concentration ratio in the coal industry is as follows: the top 4 firms control 25 percent, the top 8 firms 34 percent, the top 20 firms 50 percent. (See pp. II-2 and II-3).

GAO examined the trend since 1950 and found that the concentration ratio increased throughout 1950s and 1960s but has been declining since 1970. The reasons for the increase in the 1950s and 1960s appear to be related to generally unfavorable market conditions, merger activity, and the fact that many marginal producers left the industry. The declining concentration ratio in the 1970s appears to be the result of renewed interest in coal (particularly since 1973) and the expansion of western surface mining by new entrants into the industry. (See pp. II-5 to II-7).

Future concentration ratios for an extractive industry such as coal can be estimated by examining the concentration ratio of reserve ownership. GAO obtained data from the Federal Trade Commission on reserve ownership as of January 1, 1974. Unfortunately, these estimates are available only for this one point in time which makes it impossible to examine trends in the concentration levels of reserves. The concentration levels for reserves in 1974 were 13 percent; 18 percent; and 25 percent for the top four, eight, and twenty firms, respectively. These are lower than the production concentration ratios indicating that production concentration will probably continue its downward trend. (See pp. II-11 to II-13).

In 1974 petroleum companies as a group accounted for approximately 12 percent of production and 14 percent of reserves. The amount of reserves attributable to the petroleum industrial group is spread among twenty-four companies. These figures suggest that the potential for petroleum company domination of the coal industry, on a national basis, is low. (See pp. II-14 and II-15).

REGIONAL CONCENTRATION RATIOS AND PETROLEUM FIRM PARTICIPATION

GAO identified three distinct coal markets: 1) Eastern Appalachian consisting of states in the East including such major coal producing states as Ohio, Pennsylvania, West Virginia, and eastern Kentucky; 2) Central-Western extending from Indiana to Washington and including such key coal producing areas as Illinois, Wyoming, and Colorado,

and 3) The Southwestern, consisting of Arizona, New Mexico and Nevada. (See pp. III-1 and III-2).

Eastern Appalachian

There is little potential for domination of this market by any group of firms. Concentration ratios in this market closely approximate the National figures. For example, the top four firms control about 22 percent of production and about 15 percent of reserves. Petroleum companies accounted for 16 percent of production and 11 percent of reserves. (See pp. III-2 to III-5).

Central Western

The top four firms control 44 percent of production and 17 percent of reserves in this market. While production concentration is relatively high, the lower level of reserve concentration indicates a downward trend in the future. Included in this figure, however, are the large Federal Government reserves in this market which amount to 40 percent of the total. If these reserves were omitted from the calculation, the reserve concentration ratio for the top four firms would be increased to 27 percent. (See p. III-5).

While this still indicates a downward trend in the future, the large amount of unleased coal reserves in this market creates a dynamic situation. If some firms, for example, were to acquire large tracts of reserves either from the government or from private individuals, this could lead to an increase in concentration ratios above that presently indicated.

Federal reserves represent the main source of coal reserves in this market as such they could serve as an obstacle to any firm or group seeking to dominate this market. Through a policy of selective leasing the Secretary of Interior can effectively control the number and type of firms that enter the industry and thereby assure that a viable state of competition continues to exist. (See pp. III-8, IV-1, and IV-2).

The Federal Coal Leasing Amendments Act of 1975, if properly administered, appears sufficient to assure the competitive posture of this market. These amendments, require that the Department of Justice continually monitor the state of competition in the coal industry and that the Secretary of Interior consult with the Attorney General regarding

the effect on competition of all proposed leases. (See pp. III-8, IV-1, IV-2, V-2, V-3, and V-4).

Petroleum companies accounted for 24 percent of production and 16 percent of reserves in this market in 1974. What this does not reveal, however, is that petroleum firms have announced expansion plans which are more ambitious than other firms. These plans indicate that petroleum firms could control as much as 40 percent of this market's production by 1985. On this basis, it would appear that the potential for domination by the petroleum industry is greatest in this market. It must be stressed, however, that there are about 24 separate petroleum companies involved in this market. In order for them to dominate the market, they would have to act as a single decision-making unit, which is clearly illegal under Federal anti-trust laws. Further, since the petroleum companies will represent a fairly large number (about 10) of new entrants, they will actually reduce the concentration ratio. If all expansion plans by petroleum firms are accomplished, the four-firm concentration ratio would decline from 44 percent in 1976 to 30 percent by 1985. (See pp. III-5 to III-8, and IV-6).

Southwestern

The Southwestern market is small - representing only about 2 percent of national production. It is also unique in that almost all buyers are large electric utilities. There are five producers in this market and the four-firm concentration ratio is 97 percent, with 2 firms--Utah International and Peabody--producing 88 percent of this market's output. In view of the overwhelming dominance of these two firms in production, there is obviously a great potential for continued dominance of this market for the next several years. Four firms control 85 percent of the coal reserves under lease in this market. However, it is important to emphasize that only a small fraction of the deposits available for mining--perhaps as little as 11 percent--have been leased. Viewed in these terms, the 85 percent share of the four leading firms is reduced to less than 10 percent. Furthermore, the deposits not controlled by these four firms are principally under Indian or Federal government jurisdiction and as such, can be affected significantly by Federal leasing policy. The situation in the Southwestern market would appear to warrant explicit decisions by the Federal government to encourage entry by other firms. (See pp. III-8 to III-12).

Entry Conditions and Industrial Behavior

In the long run, market power can be sustained only if entry into the industry by potential competitors is barred. Examples of such barriers in the coal industry are access to coal reserves and requirements for capital.

As discussed earlier, the Federal government holds the key to access to reserves in the Western markets in view of its large reserve ownership in this area. Properly managed, access to reserves should not be a formidable barrier to serious potential entrants into the industry. (See pp. IV-1 and IV-2).

Likewise, capital requirements do not appear to pose an insurmountable barrier. Starting capitalization of a new 5 million ton per year mine (a large mine) has been estimated at about \$40 million, which would not be beyond the means of many U.S. corporations. Further, it is common practice for a new entrant to contract for delivery of the coal on a long term basis prior to actual development. Financial requirements necessary to begin production probably are subjected to less risk therefore than in most other industries where consumer demand is less certain until production is underway. Conversely, this raises doubts about the contention that the petroleum industry is needed as a source of financing if the coal industry is to expand. (See pp. IV-2 and IV-3).

With entry barriers as with other factors there are differences among markets. In the Eastern market, there are many small firms and small mines, a ready-made spot market for coal sales is available, and transportation facilities are abundant. In the Western markets, contract sales predominate and commitments for large scale deliveries of coal to a relatively few buyers are more common. Therefore, entry by small producers appears easier in the Eastern than in the Central-Western or Southwestern markets. (See pp. IV-4 and IV-5).

Analysis of coal prices shows that throughout most of the post-war period, until approximately 1968, coal prices remained relatively stable. Between 1968 and 1973 the price of coal increased but at about the same rate as labor costs. Since 1973 the huge increase in world oil prices and the uncertainty of supply has stimulated a greatly increased demand for coal which has resulted in substantially higher coal prices without matching increases in costs. (See p. IV-11).

This increase in coal prices since 1973 does not necessarily imply a non-competitive market. In a competitive industry, prices will rise in response to increased demand without increased costs. While higher prices for coal in response to higher world oil prices can be consistent with competitive behavior in the coal industry, one would expect a competitive and well-functioning industry to expand output and eventually reduce price in response to the greater demand. There is evidence that this is happening. An analysis of spot prices, which are the most sensitive to market conditions, shows that these prices increased sharply in 1974, but declined just as sharply in 1975. In December 1975 spot prices were at approximately the same point as December 1973 and they have remained relatively stable through mid-1977. As coal production capacity expands, contract prices should also begin to moderate. Further, the price of coal has not increased as much as other fuels. Adjusted for inflation the cost of coal to electric utilities increased about 54 percent between 1973 and 1976. During the same period, even under partial controls, the cost of oil to utilities increased 88 percent while natural gas costs more than doubled. (See pp. IV-11 to IV-15).

Comments on this report were solicited from six separate Federal agencies. Specific comments of each agency are reprinted as an appendix to the report with the exception of: the Federal Trade Commission, which provided oral comments; and the Department of Justice, which had no comments. Of the five agencies which offered comments, four were in general agreement with the conclusions of the report and/or characterized the report as informative and useful. In contrast, the Department of Interior concluded that the report was inadequate. GAO responses to specific agency comments are discussed in detail in Chapter VI. (See pp. VI-1 to VI-5).

Table of Contents

		<u>Page</u>
DIGEST		i
CHAPTER		
I	INTRODUCTION	I-1
II	CONCENTRATION IN THE U.S. COAL INDUSTRY	II-1
	Market Power and Concentration	II-1
	Concentration of Production	II-5
	Coal Reserve Concentration	II-11
	Petroleum and Other Industrial Group Participation in the Coal Industry	II-13
III	REGIONAL COAL MARKETS AND CONCENTRATION	III-1
	Classification of Coal Markets	III-1
	Concentration in Major Regional Markets	III-2
IV	ENTRY CONDITIONS AND INDUSTRIAL BEHAVIOR	IV-1
	Entry Conditions	IV-1
	Announced Expansion Plans	IV-5
	Electrical Utilities Participation in the Coal Industry	IV-10
	Prices	IV-11
V	CONCLUSIONS	V-1
VI	AGENCY COMMENTS	VI-1

CHAPTER I

INTRODUCTION

This report was originally planned as part of the GAO report, U.S. Coal Development: Promises and Uncertainties.^{1/} As research progressed, however, it became increasingly clear that the methodology and analysis involved in a study of competition in the coal industry was sufficiently complex and detailed to justify separate treatment. The report was initiated at the request of Senator Abourezk and Senator Eastland as Chairman, Committee on the Judiciary. The primary objective of this report is to determine whether there is significant potential for oil firms or, for that matter, any firm or group of firms to dominate any U.S. steam coal markets.

As an indicator of the potential for domination we examined the state of competition in the coal industry under the assumption that the less competitive an industry is the more likely that it could be dominated by a group of firms and vice versa. We measured the state of competition in terms of the share of production of the largest firms in the industry, the share of reserve ownership by the largest firms, the barriers to entry into the coal industry, and the recent trends in coal prices and their causes.

With the possible exception of oil shale, coal is the only fossil fuel for which the Federal Government is not advocating a policy of reducing consumption. Therefore, conditions which tend to promote full utilization of coal consistent with other national goals are desired. Given such goals, maximum coal production requires a competitive coal industry.

In the last 15 years, petroleum companies, either through the acquisition of established coal companies or through internal expansion, have entered the coal industry. This increased role of oil companies in the coal industry has prompted such proposed legislation as the Horizontal Divestiture in the Energy Industry Act, which would prohibit any major oil or natural gas producers from controlling mineral deposits in more than one major energy class (coal, uranium, and oil/natural gas). Such action is generally known as horizontal divestiture. Proponents of such action argue that:

--Oil/natural gas and coal are substitutes in the production of electricity. It could be in the interest of the oil companies to withhold their

coal from utilities in order to increase the value of their oil holdings, including increasing the value of oil production and reserves.

- Oil/natural gas and coal are part of a larger energy market. The acquisition of coal by companies who are also in the petroleum business raises the level of concentration and lowers the level of competition in this energy market. It could be possible, therefore, for oil companies to increase their market power by acquiring coal companies.

Opponents of horizontal divestiture legislation point to a 1974 study by the Federal Trade Commission (FTC) which concluded that the coal industry was competitive and not dominated by petroleum companies. In addition, they stress that oil companies are needed to provide the large amount of capital necessary for future expansion in the coal industry.

Chapter II of our report shows the level and trends of concentration in coal production and ownership of reserves nationwide. However, since coal is not bought and sold in a national market, caution should be exercised when analyzing the nationwide concentration ratios presented in Chapter II as they may not reliably measure the actual level of concentration in specific coal markets. In Chapter III we identify the key regional markets for coal and present concentration level data for both production and reserve ownership. In Chapter IV we review factors that affect entry into the U.S. coal industry. We also examine the amount of new mine openings by various firms and review the course of coal prices during 1973-77. Chapter V presents our conclusions. Finally, Chapter VI addresses agency comments.

Reference Notes

- 1/ U.S. General Accounting Office, U.S. Coal Development: Promises and Uncertainties (EMD-77-43), September 22, 1977.

CHAPTER II

CONCENTRATION IN THE U.S. COAL INDUSTRY

INTRODUCTION

Concentration* refers to the number of firms and their size distribution based on some characteristic such as production, sales, value of shipments, value added, assets, etc. Low concentration, holding all other factors constant, is associated with competitive markets and high concentration is associated with monopolistic or imperfectly competitive markets. This view has been developed from economic theory which assumes that a competitive market is comprised of a large number of buyers and sellers each of whom's effect on market supply is infinitesimally small. In the non-competitive market, a seller or group of sellers can influence market price or output. Additionally in markets with high concentration, economists theorize that firms will recognize the interdependence of their actions and alter their behavior from aggressive competition to one of tacit collusion. Thus, in highly concentrated industries the likelihood of joint monopoly pricing increases. Generally speaking, the greater the level of concentration, the lower the likelihood that independent pricing and output decisions will be practiced.

MARKET POWER AND CONCENTRATION

A major criticism of concentration as an indicator of monopoly or imperfect competition is that it disregards other elements of market structure. Concentration tells us little about the level of entry barriers in a market. These barriers could take the form of legal restriction, capital requirements, and technological factors to name a few. Low concentration can be consistent with a non-competitive market if barriers exist that prevent additional industrial capacity from coming on stream whether in the form of a new firm or the expansion of existing firms.

Likewise, entry into an industry may be free and relatively easy yet we may observe a small number of firms in this industry and a high level of concentration. This could be due to a variety of reasons but is generally manifested by the inability of a new entrant to cover all its costs if it began operation at prevailing industry demand. If industry demand were to increase, we might expect new entry from outside the industry and a reduction in concentration. It is also possible, however, that expansion could

* Unless otherwise noted, concentration refers to seller concentration throughout this report.

take place by existing firms either by adding to existing plant size or the creation of new plants. In this case, concentration could either increase or decrease depending on the resulting change in the distribution of production between firms. In either case, due to lack of entry barriers, we would expect the market to be relatively free of monopolistic elements. In this context, we examine the effect of entry and expansion on concentration in the coal industry in Chapter IV.

Although the relationship between concentration and the ability of firms to set prices or tacitly collude is not known with certainty there appears to be widespread acceptance in the economics profession that, holding other factors constant, the higher the level of concentration the lower the probability of competitively determined prices and the greater the potential for market domination by a firm or group of firms. The fine print in this logic is the phrase: "holding all other things constant." Obviously, other factors such as the level of entry barriers are vitally important in determining the competitive structure of an industry.

Actual industrial concentration is commonly measured by the concentration ratio, i.e., the share of the industry controlled by the largest firms. Concentration ratios traditionally measure the share of output controlled by the four, eight, and twenty largest firms. However, since participation in the coal industry requires access to coal reserves the probability of potential market domination may be more accurately estimated by examining concentration of reserves instead of annual production.

While no universally accepted concentration index can be used to classify a market or industry as competitive or monopolistic, a number of distinguished scholars have offered opinions. Joe Bain, Professor of Economics at the University of California, Berkeley, a pioneer in the field of industrial organization, estimated the relationship between the four-firm concentration ratio and the probability of anti-competitive industrial behavior. 1/ Jesse Markham, Professor of Economics at Harvard University, summarized the relationship between concentration and monopoly behavior that Bain hypothesized as follows: 2/

<u>4-Firm Concentration Ratio</u>	<u>Likelihood of Tacit Cooperation</u>
76-100%	High
51-75	Moderate
26-50	Low
0-25	Very Low

Professor Markham notes that "although there is no single litmus paper test for resolving this matter it would appear that a four-firm concentration ratio below 50 percent is a reasonable estimate of the point in which tacit collusion is difficult and unlikely." 3/ For example, Markham cites from Donald Turner, Assistant Attorney General for Antitrust Enforcement from 1965 to 1968 and Professor Carl Kaysen in their book, Antitrust Policy: An Economic and Legal Analysis, that market power should not be presumed until, for five years or more, the four-firm concentration ratio reaches 80 percent or the leading firm controls 50 percent. Professor Markham also notes that one criterion of the late Senator Hart's proposed Industrial Reorganization Act was "that a presumption of monopoly power would not be asserted until a four-firm concentration ratio of 50 percent had been reached." 4/

Although discussed in detail below, the summary of the coal production and reserve concentration ratios for 1976 and 1974, respectively, are:

	<u>Production 1976</u>	<u>Reserves 1974</u>
Top 4 firms	25.1	13.3
Top 8 firms	34.2	18.2
Top 20 firms	49.7	25.2

Source: Production - Keystone Coal Industrial Manual,
"U.S. Coal Production by Company, 1976.
Reserves - FTC Coal Data

As a comparison, the average top four concentration ratio in American Manufacturing was estimated by James V. Koch, Professor of Economics at Illinois State University, to be 37.9 percent in 1967. The same figure was estimated by the Bureau of Census to be 40.1 percent in 1970. Officials at the FTC have indicated that they have no official estimate of the present level of concentration in American Manufacturing.

To the extent that brokerage activity takes place, production data may not accurately measure the level of concentration in the market. We therefore looked

at the level of concentration based on sales. We found no appreciable difference between production and sales concentration which would warrant a change in our basic conclusions. In 1974 the 4, 8, and 20-firm sales concentration ratios were 27.1, 37.4 and 52.2 percent. Due to the insignificant difference between production and sales concentration ratios and the fact that production data were more readily available in a useful form, it, rather than sales data, will be relied on throughout the remainder of this report.

Data Sources for Concentration Ratios

Annual production data utilized to compile national concentration ratios were gathered from McGraw-Hill Inc.'s, Keystone Coal Industry Manual. We also compared the coal production figures reported by Keystone to coal production figures various firms were required to report to the FTC in regards to a special coal survey. We found no significant difference between the FTC and Keystone's data set when one took into account differences in how the two defined a relevant coal producing entity. In some cases, the grouping of companies is conducted differently by FTC and Keystone. However, this only involves a small number of companies and would not affect the concentration ratios to an appreciable extent.

In order to examine the relative size distribution of producers and coal reserve holders on a regional basis, we obtained the results of a special survey on the coal operations of approximately 107 firms by the FTC. The sample of companies in the FTC survey includes any firm that was among the top fifty coal producers in any year between 1964 and 1973. This resulted in a list of 69 companies. To this list of 69 top coal producers was added the fifteen largest railroads and 23 leading petroleum companies that were not included in the original list of 69 companies. A total of approximately 29 petroleum companies were surveyed. The survey was conducted by the Federal Trade Commission in 1975 and includes, among other things, the amount of demonstrated reserves each firm controlled on January 1, 1974. Of the firms surveyed, approximately 82 reported holding some coal deposits that conformed to the standards specified by the U.S. Geological Survey (U.S.G.S.) as part of the demonstrated reserve base.*

* Two petroleum companies, Exxon and Arco, failed to respond to the survey and estimates of their reserves holdings were made by the FTC.

The reserve data and any other company data obtained from the FTC are part of the FTC's confidential records and were made available to GAO with the understanding that GAO would not reveal any individual company data. Therefore, we have presented the FTC data in aggregate form.

CONCENTRATION OF PRODUCTION

Table 2.1 reports concentration in the U.S. coal industry on the basis of production for selected years from 1950 to 1976. We immediately observe the sharp increase in concentration which occurred during 1950-60. This increase appears to be the result of a decline in coal production from 516 million tons in 1950 to 416 million tons in 1960, a drop in the participation of small firms with production below 100,000 tons per year, and merger activity. The continued increase in concentration from 1960 to 1970 can be attributed to a further decline in the number of small firms, continued merger activity, and the growth of Peabody Coal Company.

Since 1970 there has been a steady decline, with the exception of 1972, in the level of concentration. It appears that this trend is due partially to a decline in underground coal production relative to surface mining. In 1969 coal mined underground accounted for 61.9 percent of total output. The leading eight coal producers collectively mined underground 67.9 percent of their total coal production. The decline in underground versus surface mining resulted in a decrease in the share of market production of these leading firms relative to firms primarily engaged in the stripmining of coal. The shift to surface mining was influenced to a large extent by the Clean Air Amendments of 1970, as amended (42 U.S.C. 1857) and the Federal Coal Mine Health and Safety Act of 1969 (MHSA), both of which improved the economics of surface mining relative to underground mining. Compliance with MHSA, for the most part, has resulted in a decrease in productivity in underground mining.* Thus, while MHSA may have had worthwhile social and health related effects, its secondary implications helped to place the leading underground coal producers at a disadvantage

* The 1974 contract between the Bituminous Coal Mine Operators and the United Mine Workers (UMW) calls for "helpers" in certain situations to assure safe operation of machinery. The addition of such workers to the workforce may also have contributed to a reduction in productivity in underground mines.

TABLE 2.1

National Coal Production Concentration Ratios a/
1950-76

<u>Year</u>	<u>4-Firm</u>	<u>8-Firm</u>	<u>20-Firm</u>
1950	13.6	19.4	30.4
1955	17.8	25.5	39.6
1960	21.4	30.5	44.5
1965	26.6	36.3	50.1
1970	30.2	40.7	56.5
1971	27.8	37.6	52.2
1972	30.2	40.0	55.8
1973	29.1	39.1	54.9
1974	26.6	36.7	51.2
1975	26.4	36.2	50.6
1976	25.1	34.2	49.7

Source: Keystone Coal Industry Manual, U.S. Coal
Production by Company, (Various Years).

a/ The "concentration ratios" represent the percentage of production accounted for by the largest 4, 8, and 20 producing groups.

in comparison with firms primarily engaged in the strip mining of coal.

The Clean Air Amendments of 1970 also helped to lessen the relative attractiveness of eastern underground coal versus western coal. The imposition of sulfur oxide emission standards under the authority of the 1970 Amendments caused some midwestern utilities to substitute relatively low sulfur western coal for eastern high sulfur underground coal. Of course, many other utilities substituted oil and nuclear fuels for coal before 1974 in order to comply with environmental standards.

A secondary reason for the decrease in the level of concentration after 1973 was the OPEC oil boycott. The shortage simply made coal a more attractive fuel for electric utilities in relationship to insecure residual oil. Furthermore, interstate natural gas at this time was no longer available to many utilities for a variety of reasons. This improved coal's position as a steam producing fuel. Due to this sudden increase in the demand for coal, firms with less than 100,000 ton of coal production annually nearly doubled their share of the industry from 3 percent in 1973 to 5.5 percent in 1974. Thus, marginal producers, especially those with a large proportion of excess capacity, were able to capture a larger portion of the coal industry.

Table 2.2 lists the leading twenty coal producing groups in the U.S. for 1976. From Table 2.1 we see that the top four companies' market share increased from 17.8 percent in 1955 to 25.1 percent in 1976. The increase in the top eight's concentration ratio over this period was from 25.5 percent to 34.2 percent and merely reflects the increase in the top four concentration ratio. However, the composition of the leading four groups changed between 1955 and 1976. In 1955 the four leading groups and their market share of production was:

Pittsburgh Coal Company	6.0%
U.S. Steel	5.4
Peabody Coal Company	4.2
Island Creek	2.2

Even the market share of the firms comprising the ninth through the twentieth largest remained relatively stable between 1955 and 1976. These firms had a composite 14.1 percent of total industrial production in 1955 compared to 15.4 percent in 1976. Thus, the rise in industrial concentration is nearly totally explained by the increase

TABLE 2.2

Twent, Leading Coal Producing Groups, 1976

<u>Group</u>	<u>Percent of U.S. Production</u>
Peabody	10.6
Consolidation (Continental Oil)	8.4
Amx a/	3.5
Island Creek (Occidental Petroleum)	2.6
Pittston Company	2.6
U.S. Steel Corporation	2.4
Bethlehem Mines Corp. (Bethlehem Steel Corp.)	2.1
Arch Minerals b/	2.0
Pacific Power & Light	1.8
North American Coal Corporation	1.6
American Electric Power	1.6
Old Ben (Sohio)	1.4
Montana Power Company	1.4
Westmoreland Coal	1.2
Peter Kiewitt	1.2
Eastern Associated Coal Company	1.2
Pittsburg & Midway Coal (Gulf)	1.2
Utah International	1.0
Freeman-United Coal Mining (General Dynamics)	0.9
Texas Utilities	0.9
Top Four	25.1
Top Eight	34.2
Top Twenty	49.6

a/ Standard of California owns approximately 20.6 percent of AMAX. (acquired 1975)

b/ Arch Mineral is partially (about 50 percent) owned by Ashland Oil.

Source: Keystone News Bulletin, February 28, 1977.

in the four-firm concentration, ratio. The principal reasons for this increase appear to be:

- The meteoric rise of Peabody Coal Company share of the market from 4.2 percent in 1955 to 10.6 percent in 1976.
- A growth of Amax's coal operations from 1.0 to 3.5 percent over the period. Amax was the successor to Ayrshire Collieries Corporation, the 17th largest coal operation in 1955. *
- Pittsburgh Coal Company acquired (partially) Pocahontas Fuel Company in 1956. After a name change to Consolidation Coal Company, the group acquired Traux-Traer Coal Company in 1962. **
- Island Creek acquired West Kentucky Coal Company in 1963. ***

In 1955 Peabody Coal Company decided to gradually close down all its underground mines with the exception of one of the world's largest, located in Illinois. Peabody turned to surface mining operations to improve its position in the coal industry. Between 1955 and 1969, Peabody's sales increased from 19 million tons per year to nearly 60 million tons per year. Merl C. Kelce, President of Peabody Coal Company from 1957 to 1968, indicated that the rapid growth of Peabody was due to the rapid increase in electric utility coal consumption. Peabody had a comparative advantage in the sale of steam coal to electric utilities due to its low-cost strip mines and a capable management which pioneered such developments as the unit train. 5/

Fortune Magazine offers another explanation of Peabody's rapid rise. During the 1960's, Fortune argues:

Nuclear power was then in a period of strong growth, oil was plentiful, and coal--dirty old coal--was not among the utilities favorite things.

-
- * Socal acquired 20.6 percent of Amax in 1975.
 - ** Continental Oil acquired Consolidation Coal Company in 1966.
 - *** Occidental Petroleum acquired Island Creek in 1968.

Peabody's response to this selling environment--specifically, the response of Merl C. Kelce, the brilliant, hard-driving man who had built Peabody from a small company to an industry giant--was to offer the utilities long-term contracts at attractive terms. Peabody pushed this strategy further and harder than any other coal company, and at the time, was given great credit for having stabilized its future. 6/

Fortune adds, however, that the lucrative contracts which enabled Peabody to grow spectacularly contained the "seeds of terrible trouble" since most of the contracts:

. . . were virtually dictated by the utilities with Peabody merely standing by to sign on the dotted line. The terms specified were the kind that any buyer would like when high inflation came along: low prices and long contracts, with escalator provisions, to the extent these existed at all, that responded slowly, lent themselves to interpretation and nitpicking, and in all respects allowed Peabody as little running room as possible. For example, the escalators typically did not cover productivity declines; if Peabody, in other words, came to need thirteen men to do the work that ten once did, that was the company's own tough luck. 7/

It appears that the rapid increase in Peabody's market share was probably due to Peabody's aggressive behavior in selling coal under long-term contracts to electric utilities during a period when coal's future appeared gloomy. This policy had the effect of rising industrial concentration as measured by the four-group concentration ratio, but does not suggest anti-competitive behavior.

Between 1955 and 1976 the relative position in the coal industry of such metallurgical coal producers as U.S. Steel, Bethlehem Steel, and Eastern Gas & Fuel

Associates declined. Island Creek (Occidental Petroleum), Westmoreland, and Pittston were able to improve their position marginally. However, these firms were relatively active in acquiring coal companies during this period. The production from these acquisitions offset the erosion of their positions due to their Appalachian location and underground coal operations.

The groups on the top 20 list in 1976 who do not appear among the leading 20 coal producers in 1955 are essentially strip mine producers of steam coal from central and western locations selling steam coal to electric utilities. In addition, Amax's rise in its relative position in the coal industry reflects, in large part, its nearly total reliance on strip mining steam grade coal.

COAL RESERVE CONCENTRATION

Concentration is generally reported on the basis of annual production, assets, or sales statistics. The potential for future market domination through increased production concentration can be estimated by examining the number and size distribution of firm's reserve holdings. We obtained data from the FTC on the amount of the demonstrated coal reserve base each survey firm controlled on January 1, 1974. Unfortunately, these estimates are only available for this one point in time which makes it impossible to estimate trends in the concentration levels of reserves.

Concentration of the demonstrated reserve base for 1974 is reported in Table 2.3. The four largest demonstrated reserve base holders accounted for 13.3 percent of the total. The FTC staff calculated concentration ratios on the basis of heat content, sulfur content, and the ability to use surface mining techniques in extraction. With the exception of lignite, the lowest ranking coal by heat content, the four-firm concentration ratio for these categories was below 20 percent.

On the basis of these concentration ratios it would appear that for the foreseeable future, unless circumstances changes dramatically, the potential for domination by any firm or group of firms of the total U.S. coal industry is very low.

Effect of Federal Ownership of Coal Reserves on Concentration Ratios

The FTC staff estimates that the Federal Government

TABLE 2.3

U.S. Concentration Ratios of the
Demonstrated Coal Reserve Base, 1974

Type	Concentration Ratios <u>a/</u>			Total (millions of tons) <u>b/</u>
	4-firm	8-firm	20-firm	
Total <u>e/</u>	13.3	18.2	25.2	429,341
--Bituminous	15.4	21.5	27.9	232,896
--Subbituminous	12.6	17.8	22.0	168,281
--Lignite	46.9	61.2	<u>c/</u>	28,163
--Low Sulfur <u>d/</u>	16.4	23.8	30.6	100,219
--Surface mineable	15.7	23.4	30.7	136,795

Source: FTC Draft Coal Report

- a/ The "concentration ratio's" represent the percentage of reserve accounted for by the largest 4, 8, and 20 surveyed reserve holders. These concentration ratios were calculated from a sample of 84 companies which includes estimates of Exxon and Arco, demonstrated reserve base.
- b/ Calculated from data of U.S. Department of the Interior, Bureau of Mines, Demonstrated Coal Reserve Base of the United States by Sulfur Category, on January 1, 1974 (Mineral Industry Surveys, May, 1965.)
- c/ Only 18 companies reported holdings of lignite, accounting for 73.1% of total demonstrated lignite reserves.
- d/ Low sulfur coal is defined by the FTC as the sum of bituminous coal with .8 percent or less sulfur content and subbituminous coal and lignite with .4 percent or less sulfur content.
- e/ Concentration ratios were calculated based on a universe which includes unleased Federal coal reserves. If unleased, Federal reserves are excluded the four-, eight-, and twenty-firm concentration ratios for total coal would be 18.8, 25.5, and 35.3, respectively.

owns approximately 145 billion tons of demonstrated in-place coal in the central and western regions, and does not own an appreciable amount of coal land east of the Mississippi River. Hence, we will use the 145 billion estimate as a rough approximation of total Federal coal reserve ownership. Since the Federal Government has leased about 19.2 billion tons of demonstrated in-place coal, the federal government has direct control of about 126 billion tons of the demonstrated reserve base or 29 percent of the total U.S. amount. Due to high social costs and other factors, some of these Federal reserves may not be mineable. However, if the total 126 billion tons of Federal reserves were excluded, then the concentration ratios for total demonstrated coal reserves reported in table 2.3 would have to be increased by approximately forty percent. For example, the four-firm concentration ratio for the U.S. demonstrated reserve base would be 18.8 percent instead of 13.3% as listed in Table 2.3.

On the basis of the concentration ratios presented in this chapter for both production and reserves, we cannot conclude that the coal industry, on a nationwide scale, is oligopolistic nor can we infer that the potential for domination or emerging oligopoly appears likely.

PETROLEUM AND OTHER INDUSTRIAL GROUP PARTICIPATION IN THE COAL INDUSTRY

In order to examine the participation of the petroleum industry in the coal industry, we classified as "leading petroleum companies" the set of the twenty leading producers and reserve holders of crude oil and natural gas.* In addition to the "leading petroleum companies" we added a category "all surveyed petroleum companies". This latter category includes the leading petroleum companies and all firms classified by the FTC as oil or natural gas companies. Also included in the second category are Houston Natural Gas, which owns some amount of natural gas, and Arch Mineral Corporation, which is partly owned by Ashland Oil. Neither firm was classified as a petroleum company by the FTC. A list of the companies comprising each category of petroleum

* This procedure generated a sample of twenty-five firms. One of these firms was the City of Long Beach which was ranked 16th in crude oil production in 1975. We dropped it from our list of leading petroleum companies and presumed it controlled no coal deposits.

involvement is included in the footnotes to Table 2.4.

The degree to which the "leading" and "all survey petroleum companies" participate in the coal industry is summarized in Table 2.4. Of the twenty-four firms comprising the leading petroleum companies list, sixteen reported holding some amount of coal reserves in 1974, amounting to 10.6 percent of the U.S. demonstrated reserve base. The "all surveyed petroleum companies" group accounted for 14.2 percent of the U.S. demonstrated reserve base. We also classified other surveyed companies by line of business to determine the level to which other industries participate in the coal industry. Our findings are also summarized in Table 2.4.

On a national basis, petroleum companies, as a group, accounted for approximately 19 percent of production and 14 percent of the demonstrated reserve base in 1974. However, the amount of reserves that are attributable to the petroleum industrial group are spread over twenty-four companies. This, together with the large amounts of the demonstrated reserve base controlled by the Federal Government, suggests that the potential for petroleum company domination of the coal industry, on a national basis, is low.

TABLE 2.4

U.S. Coal Production and Demonstrated
Reserve Base of Industrial Groups a/
1974

<u>Industry Group</u>	<u>Production (million of tons)</u>	<u>Percent of U.S. Production</u>	<u>Demonstrated Reserves (million of tons)</u>	<u>Percent of U.S. Demonstrated Reserves</u>
All Surveyed Petroleum Companies <u>b/</u>	114.2	18.9	60,861	14.2
Leading Petroleum Companies <u>b/</u>	66.5	11.0	45,702	10.6
Electric Utilities <u>c/</u>	24.2	4.0	11,478	2.7
Railroads <u>b/</u>	0.3	0.1	9,509	2.2
Steel <u>e/</u>	53.5	8.9	11,313	2.6
Independent and Other Coal Companies <u>f/</u>	178.3	29.5	41,923	9.6
Federal Government <u>g/</u>	-----	----	125,888	29.3
Not Surveyed <u>h/</u>	232.9	39.6	168,369	39.2
Total	603.4	100.0	429,341	100.0

Source: FTC Coal Data

Table 2.4 footnotes

- a/ The not surveyed category includes some industries listed above. The FTC approach was to only gather information for the largest firms in each industry. One should, therefore, not conclude that the figures in this table represent a precise measure of these industries participation in the coal industry. Nearly every large petroleum company was included in the survey however.
- b/ The Leading Petroleum companies include: Arco, Continental Oil, Exxon, Shell, Mobil, El Paso, Gulf, Texaco, Panhandle Eastern, Sohio, Socal, Sun, Tenneco, Phillips, Getty, Standard (Indiara), Union Oil, Cities Service, Marathon, Amerada Hess, Louisiana Land & Exploration Company, Superior, Penezoil, and Coastal States. In addition, to the 24 leading petroleum companies, the All Surveyed Petroleum Companies include: Ashland Oil, Belco, Burmah, Diamond Shamrock, Mapco, Union Pacific, Utah International, Occidental Petroleum, Kerr-McGee, and Houston Natural Gas.
- c/ Electrical Utilities include: American Electric Power Duquesne Light Company, Montana Power Co., Montana-Dakota Utilities, Pacific Power & Light, Southern Company, Texas Utilities, and Pennsylvania Power and Light.
- d/ Railroad companies include: Burlington Northern, Chessie System, Chicago-Milwaukee, Chicago, R.I., and Pacific Railroad, Chicago and Northwestern, Mississippi River Corp., Norfolk and Western, Pennsylvania Central, Rio Grande, Sante Fe, Seaboard, Southern Railway, South Pacific and St. Louis, and San Francisco.
- e/ Steel companies include: Armco, Bethlehem Steel, Cannelton Industries, Inland Steel, Jones and Loughlin, Kaiser Steel, Republic Steel, National Steel, Lykes-Youngstown, United States Steel, and Wheeling-Pittsburg.
- f/ Independent and Other Coal Companies: Amherst, Alabama By-Products, Ashland Mining, Boukal-Noonan, Blue Diamond, Carbon Industries, Drummond, Energy Fuels, Jewell, Johnstown, Kemmerer, North American, King Knob, Rochester and Pittsburg, Sahara, Westmoreland, Wright, Pittston, Alco, Allied, Amax, Bradford, Eastern, Falcon-Seaboard, General Dynamics, Peabody, Peter Kiewit, and Oglebay Norton.
- g/ FTC estimate.
- h/ Includes unsurveyed firms, state and local governments, and Indian tribes.

Footnote References

- 1/ Joe S. Bain, Industrial Organization, (New York: John Wiley and Sons Inc., 1968), pp. 135-136.
- 2/ Jesse S. Markham, Anthony P. Hourihan, Francis L. Sterling, Horizontal Divestiture and the Petroleum Industry, (Cambridge, Mass.: Management Analysis Center, Inc., January 1977), p. 16.
- 3/ Ibid., p. 16.
- 4/ Ibid., pp. 16-18.
- 5/ Respondent's Proposed Findings of Fact and Conclusions of Law, Kennecott Copper Corporation Case, Federal Trade Commission, Docket No. 8765, September 10, 1969.
- 6/ Carol Loomis, "Down the Chute with Peabody Coal," Fortune, May 1977, pp. 232.
- 7/ Ibid.

CHAPTER III

REGIONAL COAL MARKETS AND CONCENTRATION

INTRODUCTION

The concentration ratios that were reported in the previous chapter suggest that no single firm nor any group of firms dominate the coal industry on a national basis. In this chapter we seek to determine if any firm or group of firms dominate any regional coal market.

CLASSIFICATION OF COAL MARKETS

A proper definition of the market requires delineation of the market in terms of both product and geographic boundaries. However, the FTC survey data do not distinguish metallurgical from steam coal, and therefore as in Chapter II, our review of concentration in regional markets is based on ownership of all types of coal. As it turns out, this does not handicap our study because the greatest potential for petroleum firm domination occurs west of the Mississippi and this area contains very small amounts of metallurgical coal. This almost complete lack of metallurgical grade coal deposits in the western markets greatly facilitates our defining the relevant product market boundaries.

Delineation of geographic market boundaries is a complex task. Overlaps and/or gaps among market areas, changes in market shape over time, and data aggregation problems necessitate the use of judgment in the estimation procedure. The most widely used procedure is the one employed by the Energy Policy Project of the Ford Foundation.

This method defined market areas by simultaneously taking into account both supply and demand factors. The Energy Policy Project analysis resulted in two distinct trading areas: an Eastern market composed of nine states, and a combined Central and Western market. 1/

We applied the Energy Policy Project methodology to actual shipments for 1972 through 1975 and to projections of steam coal shipments to electric utilities for 1978 and 1983. On this basis, we identified the following markets:

Eastern Appalachian

--consists of states along the East Coast (less New England) and includes such key coal producing areas as Ohio, Pennsylvania, West Virginia, and eastern Kentucky.

Central Western

--Extends from Indiana to Washington and south to Texas and includes such key producing states as Illinois, Wyoming, Colorado, and Montana.

Southwestern

--consists of Arizona, New Mexico, and Nevada.

The Eastern-Appalachian market will probably retain its present configuration for the foreseeable future. In contrast, the Southwestern market may become integrated with the larger Central-Western market by the late 1980's. Such absorption of the Southwestern market could result from shipments of New Mexico coal to Texas or from expansion of coal mining activity in Colorado and Utah.

The Eastern-Appalachian and Central-Western markets closely approximate aggregations of United State Geological Survey coal basins. Consequently, we were able to use Federal Trade Commission survey data on concentration ratios for production and reserves in these two markets. For the Southwestern market, calculations of concentration ratios on production were based on publicly available data (the Keystone Manual) because the Federal Trade Commission survey data did not correspond to the actual shape of the market. The concentration ratio for reserves in this market were calculated on the basis of information we compiled from various sources in that market.

CONCENTRATION IN MAJOR REGIONAL MARKETS

Eastern Appalachian Market

Since nearly all non-Appalachian states that are included in this area do not contain significant coal deposits, nearly all producers are located in the area the U.S.G.S. classifies as the Northern and Southern Appalachian Basins.

Production concentration ratios for 1964-1974 follow the same trend as those for the total U.S. Concentration

ratios in 1974 for the Eastern-Appalachian market based on production and demonstrated reserves are presented in Table 3.1. In 1974, the 4, 8, and 20-firm production concentration ratios were 22.3, 32.5, and 44.2 percent, respectively. Besides being the largest coal producing market in the U.S., this region contains a large number of small, independent producers. In 1975 about 5.5 percent of total U.S. coal production was accounted for by 2,299 firms with annual output of less than 100,000 tons of coal. Over 80 percent of these small firms are located in this market.

An analysis of Table 3.1 shows that concentration of reserves is lower than concentration of production, implying that the future trend of concentration in production will be downward. For example, the 4 largest firms control 22.3 percent of production, but only 15.2 percent of total reserves. Of particular note, however, is that the four largest firms currently control about a third of the market's low sulfur reserves.

Low sulfur coal will probably be in greater demand than high sulfur coal and may also have a strong economic advantage. For example, the 1976 National Energy Outlook estimates that cleaning up high sulfur coal can add about 26 percent to a utility's fuel costs. However, a requirement for scrubbers on all coal fired plants would reduce the advantage of low sulfur coal. The concentration ratios for low sulfur coal, although below the commonly used standards for indicating high concentration, are higher than the total. If the demand for low sulfur coal grows much faster than for all coal, the trend in the concentration ratio for low sulfur should be monitored separately.

Petroleum Industry Participation

In 1974 only six petroleum companies mined coal in the Eastern-Appalachian Market: Sohio (Old Ben Coal Company), Continental Oil (Consolidation Coal Company), Belco Petroleum, Ashland Oil (Arch Mineral Corporation), MAPCO (Webster County Coal Corporation), and Occidental Petroleum (Island Creek). In 1976 Panhandle Eastern Pipeline acquired the Younghiogheny and Ohio Coal Company and Quaker State purchased the Valley Camp Coal Company.

Including the two acquisitions noted above, the share of leading petroleum companies would have been approximately 10.8 percent of production and 7.4 percent of the Eastern-Appalachian demonstrated reserve base in 1974. All surveyed

TABLE 3.1

Production and Reserve Concentration Ratios a/
Eastern Appalachian Market
1974

	<u>Concentration Ratios</u>			<u>Total Production or Demonstrated Reserves (million tons)</u>
	<u>4-firm</u>	<u>8-firm</u>	<u>20-firm</u>	
<u>Production</u>	22.3	32.5	44.2	377.7
<u>Demonstrated Reserves</u>				
Total	15.2	22.8	29.9	106,025 <u>b/</u>
--Bituminous	15.2	22.8	30.0	104,999
--Subbituminous	*	*	*	*
--Lignite	<u>c/</u>	--	--	1,027
--Low Sulfur	32.2	46.7	58.3	17,173
--Surface Mineable	7.9	9.7	12.0	15,736

a/ The "concentration ratios" represent the percentage of production or reserves accounted for by the largest 4, 8, and 20 firms surveyed by the FTC.

b/ Calculated from data of U.S. Department of the Interior, Bureau of Mines, in Demonstrated Coal Reserve Base of the United States, by Sulfur Category, on 1/1/74, (Mineral Industry Surveys, May 1975).

c/ Only one company reported holdings of lignite, accounting for 18.3 percent of lignite reserves.

* Reserve type not significant in region.

Source: FTC Draft Coal Report.

petroleum companies accounted for 15.9 percent of production and 10.8 percent of demonstrated reserves. Thus, market share based on production and reserves of these companies is relatively low, suggesting that petroleum companies do not and are not likely to dominate this region.

On the whole, the relatively low concentration levels based on both production and reserves along with the large number of small independent producers indicates that the Eastern market is competitive and its future domination by any firm or group of firms is highly unlikely.

Central Western Market

Concentration ratios for the Central-Western market based on production and demonstrated reserves are presented in Table 3.2. The 4, 8, and 20-firm production concentration ratio was 44.4, 55.1, and 74.8 percent respectively in 1974. An analysis of Table 3.2 shows that while concentration of production is relatively high, the greater dispersion of coal reserve ownership implies substantially lower concentration in the future. Furthermore, the share of the largest four firms is not substantially greater for low sulfur or surface mineable coal reserves than coal reserves in total. Of course, since a great deal of coal reserves remains undeveloped, the situation could change. If some firms are able to acquire large tracts of coal reserves, either from the government or from private individuals, this could lead to an increase in concentration above that presently indicated.

As indicated in Table 3.2, removing unleased Federal Government reserves would raise the four-, eight-, and twenty-firm concentration ratio for the Central-Western market to 27.0, 35.7, and 47.0 percent, respectively.

Petroleum Industry Participation

We found that sixteen leading petroleum companies held some coal reserves in the Central-Western market in 1974. Of these sixteen, only four mined coal in that year. The share of market production and the amount of the demonstrated reserve base held by these leading petroleum companies and other industrial groups are summarized in Table 3.3. This table indicates that petroleum companies accounted for 23.6 percent of total production and 15.8 percent of the demonstrated reserve base in 1974. In 1975 Standard of California (Socal) acquired about twenty percent of Amax Inc., the parent of Amax coal Company, which mined nearly twenty million tons of coal in 1974.

TABLE 3.2

Production and Reserve Concentration Ratios a/
Central Western Market
1974

	<u>Concentration Ratios</u>			<u>Total Production or Demonstrated Reserves (million tons)</u>
	<u>4-firm</u>	<u>8-firm</u>	<u>20-firm</u>	
<u>Production</u>	44.4	55.1	74.8	210.5
<u>Demonstrated Reserves</u>				
Total	16.5	21.8	29.3	323,198 <u>b/</u>
--Bituminous	20.4	25.7	30.0	127,780
--Subbituminous	12.6	17.7	21.9	168,281
--Lignite	48.0	62.8	<u>c/</u>	27,137
--Low Sulfur	18.8	23.5	27.4	83,047
--Surface Mineable	17.4	26.1	34.3	121,059
--Excluding Federal	27.0	35.7	47.0	197,198

a/ The "concentration ratios" represent the percentage of production or reserves accounted for by the largest 4, 8, and 20 firms surveyed by the FTC.

b/ Calculated from data in Demonstrated Coal Reserve Base of the United States, by Sulfur Category, on 1/1/74. (Mineral Industry Surveys, May 1975). U.S. Department of the Interior, Bureau of Mines. Included in these totals are 4.7 billion tons of reserves from Arizona and New Mexico which are part of the Southwestern market. FTC data could not be disaggregated to identify reserves in Arizona and New Mexico by company. Therefore, the concentration ratios for reserves may be slightly distorted. The degree of distortion would be small. The maximum range being plus or minus 1 to 2 percent.

c/ Only 18 companies reported holdings of lignite, accounting for 75.2 percent of such reserves.

Source: FTC Draft Coal Report and Keystone Coal Industrial Manual, U.S. Coal Production by Company, (1974).

TABLE 3.3

Coal Production and Demonstrated
Reserve Base of Industrial Groups
in the Central Western Market, 1974

<u>Industrial Groups a/</u>	<u>Production (million tons)</u>	<u>Percent of Production</u>	<u>Demonstrated Reserves (million tons)</u>	<u>Percent of Demonstrated Reserves</u>
All Surveyed Petroleum Companies	49.7	23.6	51,082	15.8
Leading Petroleum Companies	24.9	11.8	38,700	12.0
Electric Utilities	14.4	6.8	8,065	2.5
Railroads	0	0	7,723	2.4
Steel	5.7	2.7	2,501	.8
Independents and Other Companies	100.2	47.6	32,227	10.0
Federal Government	0	0	125,888	39.0
Not Surveyed b/	40.5	19.3	95,712	29.6
Total	210.5	100.0	323,198	100.0

a/ For a complete listing of firms contained in each group see Table 2.4.

b/ The not surveyed category include some industries listed above. The FTC approach was to only gather information for the largest firms in each industry. One should, therefore, not conclude that the figures in this table represent a precise measure of these industries participation in the coal industry. Nearly every large petroleum company was included in the survey however.

Source: FTC Coal Data and Keystone Coal Industrial Manual, "U.S. Coal Production by Company", (1974).

Current coal production by petroleum companies is relatively small in relation to reserve holdings but this could reflect a decision by these large petroleum companies to enter the coal industry in western states where large scale mining has only recently commenced. Coal mine expansion plans indicate that petroleum companies are developing these reserves at rates in excess of any other industrial group. This situation, however, should continue to be monitored.

While petroleum companies accounted for 15.8 percent of reserves in this market, these reserves are shared among 24 companies. The remaining reserves are held by non-oil companies, individuals, state and local Governments, Indian tribes, and the Federal Government. The Federal Government holds a sizeable, about 40 percent, of this market's demonstrated reserve base. These large tracts of Federally owned coal lands appear to be a sizeable obstacle to any company or small group of companies who attempt to "dominate" this market. Federal reserves represent the main source of coal reserves available to potential entrants into the market. The Secretary of Interior, who has responsibility for leasing these reserves, is required by law to consider the impact granting of such leases will have on competition in the coal industry. Thus, through a policy of selective leasing the Secretary of Interior can effectively control the number and type of firms who enter the industry and at the same time assure that a viable state of competition continues to exist.

On the basis of present concentration ratios the potential for oil company domination appears greatest in the Central-Western market. As indicated in Chapter four, oil companies have announced coal mine expansion plans which represent 53 percent of the total expansion plans for the Central-Western market by 1985. As a result, oil companies could control 40 percent of this market's total production by 1985. It must be stressed, however, that this represents the production of 17 separate companies.

The Southwestern Market: A Special Case *

- * Elsewhere in this report, we refer to the demonstrated reserve base, defined according to U.S.G.S. standards. However, comparable and reliable data for Arizona and New Mexico could not be obtained. Hence, in our discussion of the Southwestern market, we refer to the term "coal deposits" without distinction to U.S.G.S. definitions such as the demonstrated reserve base or recoverable reserves.

The two markets discussed above exhibit considerable diversity. The buyers include steel producers and general industrial users in addition to the electric utilities. The type of coal sold varies enormously from very high to very low levels in heat and sulfur content. The sellers, particularly in the Eastern-Appalachian market, include independent coal firms and large multiproduct corporations such as Continental Oil, owner of the Consolidation Coal Company.

In the Southwestern market the buyers are virtually all electric utilities. Furthermore, a given generating station will often be so large that several large utilities will choose to operate it as a joint venture. * A further reason for several owners is the absence of adequate transportation facilities. The Eastern-Appalachian market is characterized by many miles of railroad track. In the Southwest, fewer rail lines are available and the utilities must occasionally develop their own transportation facilities.

The owners of Arizona's largest electric generating station constructed a 78 mile electric railroad to haul coal to the generating station. A conveyor belt moves the coal 5 miles to the train. Another large, coal-fired generating station** owned by one public utility required construction of over 100 miles of track, with about one-third of the new track installed by the utility and the remainder by the Santa Fe Railway.

The Southwest is also the location of the only major coal slurry pipeline in the U.S. This 273 mile pipeline has a diameter of 18 inches and can transport almost 5 million tons of coal per year from Arizona to Nevada. The pipeline, which is owned by the Black Mesa Pipeline Company, receives its coal from the Peabody Coal Company and delivers it to the Mohave Generating Station, which is owned by four utilities and managed by Southern California

* For example, the Navajo Power Project is Arizona's largest generating station, serving customers in Arizona, California, and Nevada. It has a rated capacity of 2,250 MW (enough to serve 500,000 customers) and is owned by 3 private utilities, 2 public utilities, and the U.S. Bureau of Reclamation. One of the public utilities serves as manager.

** Called the Coronado Generating Station.

Edison.

In sum, considerable movement of steam coal from large mines to large generating stations by the most modern methods is common in northern Arizona, New Mexico, and southern Nevada. Once converted into electricity, the coal "moves by wire" throughout these three states and to southern California. Were the demand for coal to rise substantially, coal deposits in Utah might be developed, extending the market into this state. Conceivably, coal shipments from New Mexico to Texas could be made. While such future developments can be envisioned, available data suggest that, for at least the next 5 years, the relevant market will consist of the states of Arizona, Nevada, and New Mexico. In any event, it is clear that the Southwest is a special case.

From an examination of the Keystone Coal Industry Manual, we were able to identify five producers of coal in this region, as shown in Table 3.4. This table shows that the 4-firm production concentration ratio is 97.6 percent and that two firms, Peabody Coal Company and Utah International, collectively produced 88.0 percent of this market's output. In the FTC survey Utah International was listed as a petroleum company and we therefore have included it in our list of all petroleum companies. It should be noted, however, that according to Moody's Industrial Manual, Utah International's principal business is mining coal, iron ore, uranium and copper. Other activities include acquisition and development of oil and gas properties.* In 1976, the company merged with General Electric Company, a major supplier of electrical generating equipment.**

In view of the overwhelming dominance of these two firms in production, there is obviously a great potential for continued dominance of the Southwestern market by the owners of Utah International and Peabody for the next several years.

A survey by GAO consultants, further revealed, that Peabody and Utah International control about 54 percent

* Utah International produced 2,435 million barrels of crude oil and 26.9 billion cubic feet of gas in 1975.

** Under the terms of the approved merger Utah International's uranium business will function as a independent company and is prohibited from selling uranium to General Electric.

TABLE 3.4

Production in the
Southwestern Market, 1974 a/

<u>Rank</u>	<u>Company</u>	<u>Production (000 tons)</u>	<u>Share (percent)</u>	<u>Cumulative Share</u>
1	Utah International	6,955	45.7	45.7
2	Peabody Coal Co.	6,448	42.3	88.0
3	Western Coal	957	6.3	94.3
4	Pittsburg & Midway Coal Company (Gulf Oil)	509	3.3	97.6
5	Kaiser Steel Corp.	363	2.4	100.0
	Total	15,232		

a/ Southwestern market includes New Mexico, Arizona,
and Nevada.

Source: Keystone Coal Industry Manual, U.S. Coal
Production by Company, 1974.

of the deposits under lease. Other large holders of leases to Southwestern coal reserves are El Paso Natural Gas and Pittsburg and Midway Coal Company (Gulf Oil). These 4 firms control approximately 85 percent of the deposits under lease.

It is important to emphasize that only a small fraction of the deposits potentially available for mining--perhaps as little as 11 percent--have been leased. Viewed in these terms, the 85 percent share of Peabody, Utah International, El Paso, and Pittsburg and Midway reduces to less than 10 percent. Furthermore, the deposits not controlled by these 4 firms are principally under Indian or Federal Government jurisdiction. Federal leasing policy as stipulated in the Federal Coal Leasing Amendments Act of 1975, mandates the promotion of competition in the coal industry and requires the use of a deferred bonus bidding system for 50 percent of all new leases. If this policy is properly administered by the Secretary of Interior, the access to Southwestern coal by prospective entrants into the market should be enhanced.

Unfortunately, the Southwestern market is also a special case in terms of entry--at least potentially so. Given the propensity for large generating stations in the Southwestern market, a prospective new entrant must have the knowledge, capital, etc., to commence operations at a high level (e.g., 5 million tons per year). More importantly, the prospective entrant must convince the electric utility (or consortium of utilities) that he is capable of a 25, or more, year commitment to service. Hence, demonstration of general ability to operate on a relatively large scale appears more significant than access to deposits or possession of a lease. Under these circumstances, without explicit decisions by the Federal Government or the Indian tribes to encourage entry by other firms through selective leasing procedures, the continued dominance by a handful of large firms appears likely in this market.

FOOTNOTE REFERENCES

- 1/ Thomas D. Duchesneau, Competition in the U.S. Energy Industry, (Ballinger Publishinging Company: Cambridge, Massachusetts - The Ford Foundation, 1975). p. 33.

CHAPTER IV

ENTRY CONDITIONS AND INDUSTRIAL BEHAVIOR

INTRODUCTION

In the previous three chapters, we examined in detail the level of seller concentration of production and reserves in the coal industry. The concentration ratios suggest that present or future domination of the coal industry by any firm or group of firms is unlikely, although in the Central-Western market there seems to be some potential for market domination, especially by petroleum companies. Furthermore, the Southwestern market presents unique problems and requires sustained observation. In this chapter, we will examine entry conditions and industrial behavior such as expansion plans and price actions which can also affect the future competitiveness of the industry.

ENTRY CONDITIONS

In the long run, market power can only be sustained if entry is barred. In this context anything which deters or prevents new firms from entering the market is an entry barrier. Examples of such barriers to entry include availability of reserves, capital requirements and economies of scale.

Reserve Requirements

Obviously, entry into coal mining requires the securing of reserves. In the last two chapters, we showed that the demonstrated coal reserves in the United States are relatively abundant in relationship to current production and that no firm or group of firms appears to dominate the reserve base. In fact, the Federal Government is the single largest holder of the demonstrated reserve base. Federal reserves represent the main source of remaining reserves available to firms who do not currently own or control reserves but wish to enter the coal industry. Hence, the Federal Government has major control over coal reserves as a barrier to entry. In recent years, few leases have been issued. Obviously, the leasing of coal resources to new entrants would tend to increase competition; however, there are other considerations which must be considered in establishing a leasing policy. These include:

--determining what portion of future coal production

will come from Federal lands, and over what time frame;

--determining whether coal resources now under lease are adequate to satisfy immediate needs, and, if not, what leasing schedule is required; and,

--receiving a fair market value return for the lease.

In essence, while leasing policy must consider competition, it must also coordinate the leasing schedule with production requirements. Since the value of coal is expected to continue to rise, it is important that resources not be leased before they are required if the public is to be assured of a fair market value return.

Clearly, Federal leasing policy has and will continue to have a significant impact on an individual firm's ability to enter the coal market as a competitor. Under the Federal Coal Leasing Amendments Act of 1975, the Secretary of Interior is required, with the assistance of the Attorney General, to determine the competitive impact of a lease on the coal industry. Thus, the Secretary of Interior could substantially change the number and distribution of reserve holders in the coal market by selectively determining who should or should not be granted leases. If any companies or group of companies were able to gain market power, the Federal Government could dissipate this market power by leasing to new entrants or other less "threatening" companies.

Capital Requirements

Various estimates of the capital requirements of opening new mines have been made. The National Petroleum Council estimated the original capital investment of a 5 million ton underground mine operating in 1975 at 42.3 million dollars. ^{1/} A surface mine of the same capacity was estimated to represent an original outlay of 36.7 million dollars. In 1975, more than 75 percent of U.S. coal mines had annual production of less than 1.8 million tons. This suggests that the above estimates of original capital investment could be reduced considerably for many new entrants. However, capital outlays of even the higher magnitude are not beyond the means of many U.S. corporations.

In addition, long-term contracts might aid potential entrants or existing firms in securing the necessary capital to undertake coal development. In some cases, electric utilities, the final consumer of most steam coal, directly

finance the coal operations of a particular mine. These arrangements reduce the discouraging effect that high capital outlays could have on entry into a coal market. In the coal industry, unlike many other industries in the U.S. economy, contracted sales account for about 80 percent of total industry sales. In the West, nearly all sales are via long-term contract. In this respect, then, a new entrant is likely to contract with potential buyers before constructing a large scale operation. Thus, the financial requirements necessary to begin production, probably are subjected to less risk than in the manufacturing sector where consumer demand acceptance is often less certain until after production is underway.

The above discussion suggests that capital requirements are not a significant barrier to entry into the coal industry. In addition, the need for the capital resources of exceptionally large firms (e.g., leading petroleum companies) is apparently limited.

Economies of Scale

The available evidence suggests that there are economies of large scale operation in the production and transportation of coal. Economies of scale refers to a production process where unit variable costs fall as output or volume increases. If a new entrant must produce at a high level of output in order to be competitive (i.e., not be at a significant cost disadvantage relative to his competitors), he may be dissuaded from entry into the industry. In addition, if a new entrant must produce a significant amount relative to existing output in order to have the same relative costs of production as existing firms, he may be dissuaded from entry since (1) the market may not absorb all this extra output or (2) in order for the market to absorb this extra output prices must fall, thus reducing the return to his investment.

There is some evidence that in the coal industry mines in the 3 to 5 million ton range of annual production have significant cost advantages over smaller operations. ^{2/} However, 5 million tons represents less than one percent of 1974 coal production. The relatively small increase in coal production resulting from the entry of a mine in the 3 to 5 million ton range could easily be absorbed by the market without any significant impact on coal prices. In addition, in 1975 only 16 mines had annual production in excess of 3 million tons and only fifty mines had annual production exceeding 1.9 million tons. This suggests that on a national level economies of

scale do not significantly reduce entry into the coal industry.

We also analyzed economies of scale as a barrier to entry on a regional basis and found that, although substantial barriers to entry do not exist in the Eastern market, factors unique to the Central-Western market make entry by very small firms unlikely.

The Eastern Appalachian Market is characterized by an elaborate and diverse transportation network encompassing barge, rail, and truck. Due to this transportation network as well as the relative close proximity between mine and customer, coal is sold not only by contract but also in a spot market. This spot market allows eastern utilities flexibility in the amount of long-term contracted coal they need and an outlet for coal from relatively small mine operations that cannot produce on a large scale. Thus, economies of scale are not a barrier to entry and a substantial number of firms with annual coal production of less than 100,000 tons operate in the Eastern-Appalachian market.

However, small mine operations face serious obstacles in the West, where coal must be transported over long distances to reach its customers. This increases the importance of unit train transport and generally makes supply of a given power plant by one large coal mine advantageous. Moreover, differences in coal characteristics (e.g., Btu and ash content), interfere with supply of a given power plant from several sources. For these reasons, western utilities cannot rely on a spot market and they usually contract for all their coal requirements. The majority of western electrical generating units coming on line by 1985 will be of 400 megawatt capacity or more. Such a plant requires approximately 1 million tons of coal per year. Hence, small mine operations (less than 500,000 tons of annual production) that cannot supply the yearly steam coal needs of an electrical utility are not significant factors in this market.

While small mines are at a severe competitive disadvantage in the west, entry barriers for larger scale operations due to the economies of scale in production appear low. Annual production capacity of western coal is projected by the Keystone Coal Industrial Manual to be over 500 million tons by 1985. ^{3/} As discussed later, our estimate is somewhat lower (about 300 million tons). However, if such expansion were to occur, even a mine as large as 5 million tons would account for a mere one percent of the region's total yearly

production. If the minimally efficient mine size is in the 3 to 5 million range, then such a mine would supply one percent or less of the additional market output and its entry into the market would probably have an insignificant impact on coal prices. This would still be the case if expansion were only 300 million tons.

In summary, the existence of a viable spot market for coal in the Eastern Appalachian market provides an outlet for coal from relatively small mine operations and economies of scale are not a substantial barrier to entry. In contrast, in the western markets, economies of scale realized by unit train shipments and the use of long term contracts by electric utilities represent substantial barriers to successful entry for mines producing less than 500,000 tons per year. Above this scale of operation, however, entry barriers appear low. The above discussion suggests that, relative to the Eastern-Appalachian market, the Western markets will be characterized by large mines and fewer potential entrants.

ANNOUNCED EXPANSION PLANS

A survey of new coal mine openings conducted by the Keystone Coal Industry Manual reported that, from 1976 through 1985, additional capacity representing about 560 million tons of steam coal is expected to be brought on line. ^{4/} The eastern states account for 13 percent of these steam coal plans. Illinois, Indiana, and western Kentucky account for 7 percent; states west of the Mississippi River account for 79 percent. Wyoming, alone, accounts for 195 million tons, or 35 percent of this new capacity.

The ten companies which have the largest planned increases account for 53 percent of the total 560 million tons of new steam coal capacity planned during the period 1976-1985. The top 20 companies account for 71 percent. Large electric utilities account for over one-fourth of announced capacity increases and leading petroleum companies account for almost one-half of this planned total (Table 4.1). The Keystone survey data may overstate the total expansion of the industry, as suggested in a recent GAO report. ^{5/} However, there appears to be no reason why one group of firms would experience a disproportionate share of any cutback in planned capacity additions.

Petroleum Company Participation in Planned Expansions

In the Eastern-Appalachian Market, petroleum companies

as a group are a relatively minor factor, controlling about 11 percent of the demonstrated reserve base and 16 percent of production.

In the Central-Western Market, petroleum companies hold about 16 percent of the total demonstrated reserve base and control 25 percent of production, indicating a higher potential for oil company domination in this market than in the East. However, the coal reserves attributable to petroleum companies are held by over twenty-four firms. Domination of this market by the oil industry would require that all 24 firms act as one.

Table 4.1 implies that petroleum companies as a group appear to be developing their reserves at a higher than average rate. For example, all petroleum companies account for one-third to almost one-half of planned expansion. In addition, Table 4.2 clearly shows that petroleum companies are developing reserves mainly in the western United States where they hold the largest amount of their undeveloped reserves. For example, Arco, Kerr-McGee, Sun Oil, and Shell Oil, are planning to open new mines with an aggregate of 100 million tons of capacity in the Central-Western Market. Thus, at least as far as expansion plans are concerned, petroleum companies are not "sitting on their reserves" in order to keep coal supplies from the market. In fact, petroleum companies seem likely to increase their importance in the Central-Western market. In the Central-Western market, if all present coal mine capacity were to be still available in 1985, leading petroleum companies will account for about 40 percent of the sales in this region. This entry will reduce the four-firm and eight-firm production concentration ratio for the Central-Western market as follows:

	Four-Firm Concentration <u>Ratio (%)</u>	Eight-Firm Concentration <u>Ratio (%)</u>
1974	44.4	55.1
1985	30.9	46.3

Therefore, increased capacity expansion by petroleum companies will have two significant effects on the Central-Western market. First, since the petroleum companies will represent a fairly large number (about 10) of new entrants into the industry, production concentration ratios will decline from their present levels. Assuming that each

TABLE 4.1

U.S. Steam Coal Expansion of Selected
Oil Companies, Railroad Companies,
Electrical Utilities, Steel Companies
(1976-85)

<u>Firms</u>	<u>Percent of Total U.S. Capacity Expansion Plans</u>
<u>OIL COMPANIES:</u>	
AMAX <u>a/</u>	7.3
Kerr-McGee Corporation	6.4
Arco	5.7
Gulf Oil Company	3.8
Exxon Corporation	3.7
Union Pacific Corporation <u>b/</u>	3.7
Shell Oil Company	3.5
Continental Oil Company	2.8
Sun Oil Company	2.1
Sohio	1.1
Occidental Petroleum <u>c/</u>	1.0
Utah International	0.9
Houston National Gas	0.9
Quaker State	0.9
El Paso Natural Gas	0.9
Ashland Oil-Hunt Enterprises <u>d/</u>	0.5
Coastal States	0.1
Sub-Total	45.2
<u>RAILROAD COMPANIES:</u>	
Union Pacific Corporation <u>b/</u>	3.7
Burlington-Northern, Inc.	0.9
Sub-Total	4.6
<u>STEEL COMPANIES:</u>	
United States Steel	0.5
Beckley Coal Company <u>e/</u>	0.3
Bethlehem Mine Corporation	0.1
Sub-Total	.9

Table 4.1 continued

<u>Firms</u>	<u>Percent of Total U.S. Capacity Expansion Plans</u>
<u>ELECTRIC UTILITIES:</u>	
American Electric Power	5.8
Texas Utilities	5.2
Pacific Power and Light <u>b/</u>	3.5
with Idaho Power Co.	5.5
with Washington Water Power	1.2
with Decker Coal Company	13.0
Montana-Dakota Utilities	2.0
Nevada Power Company	2.0
Intermountain Power Project	1.8
Utah Power and Light Co.	1.5
Texas Municipal Power Project	1.4
Black Hills Power & Light Co.	1.4
Montana Power Company	1.1
Duke Power Company	0.3
Tampa Electric Company	0.1
Sub-Total	<u>26.0</u>
<u>OTHER COMPANIES</u>	23.3
Total <u>f/</u>	100.0
All Petroleum Companies	45.2
Leading Petroleum Companies	30.9

a/ Socal owns 20.6 percent of AMAX.

b/ Includes total capacity expansion of all joint ventures.

c/ Includes some metallurgical coal production. Data could not be disaggregated.

d/ Arch Mineral Company is jointly owned by Ashland Oil Company and Hunt Enterprises.

e/ Jones and Laughlin and three other steel companies own Beckely Coal Company.

f/ Individual columns do not sum to total since Union Pacific was considered both a railroad and a petroleum company.

Source: Nielsen, George F., "New Coal Development Plans to 1985," Coal Age, February 1977.

TABLE 4.2

Location of New Mine Openings
by Petroleum Companies
1976-85

<u>MARKET/COMPANY</u>		
<u>EASTERN APPALACHIAN</u>	<u>Tonnage</u> <u>(millions)</u>	<u>Percent of</u> <u>Market</u>
Occidental Petroleum	5.6	6.3
Quaker State	2.0	2.3
Continental Oil	0.25	0.3
Total Petroleum	7.85	8.9
 <u>CENTRAL-WESTERN</u>		
<u>Leading Petroleum Companies</u>		
Arco	32.0	6.9
Amax	41.2	8.9
Continental Oil	15.4	3.3
Exxon	20.6	4.4
Sohio	6.1	1.3
Gulf Oil	16.9	3.6
Shell Oil	20.0	4.3
Coastal States	.5	.1
El Paso	5.0	1.1
Sun Oil	12.0	2.6
Sub-Total	<u>169.7</u>	<u>36.5</u>
 <u>Other Petroleum Companies</u>		
Arch Mineral Corp.	2.6	.6
Houston Natural Gas	5.3	1.1
Utah International	2.6	.6
Quaker State	2.8	.6
Kerr-McGee	36.0	7.7
Union Pacific	20.7	4.5
Sub-Total	<u>70.0</u>	<u>15.1</u>
Total Petroleum	239.7	53.6
 <u>SOUTHWESTERN:</u>		
Utah International	2.6	13.3
Gulf Oil	<u>4.5</u>	<u>23.0</u>
Total Petroleum	<u>7.1</u>	<u>36.3</u>
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Source: Nielsen, George F., "New Coal Development Plans to 1985," Coal Age, February 1977.

of these firms represented an independent decision-making unit this could be viewed as having a positive effect on the level of competition in the industry and indicates that entry by petroleum companies could result in a higher degree of competition by 1985. Secondly, as noted above, these same petroleum companies will account for about 40 percent of the total coal sales in this market by 1985. This suggests that petroleum companies as a group have the potential to dominate the Central-Western market. However, in order to exercise this market power these firms would have to be operating as a single decision-making unit. Such collusion is obviously illegal under the present antitrust laws and firms operating in such a manner would be subject to legal action by the Federal Trade Commission and Department of Justice. Petroleum company participation in the Southwestern market has been more limited. However, Utah International apparently possesses large reserves of uranium in addition to its reserves of fossil fuels. Furthermore, this firm's 1975 production of crude oil and gas was considerable, as noted in chapter III. Since its parent company manufactures electrical generating equipment, the acquisition of future reserves by this firm may warrant close attention.

ELECTRICAL UTILITIES PARTICIPATION IN THE COAL INDUSTRY

Electric utility companies are an important factor in the U.S. coal industry. Coal delivered to electric utilities accounted for 76 percent of all coal purchases in 1976.

The electric utility industry also accounts for the second largest amount of new coal mine capacity plans. For some electrical utilities, this expansion represents their initial entrance into the coal industry. Utilities can enter into coal production via a number of routes. Besides having their own independent coal operations, utilities can enter the industry through a joint venture, such as Pacific Power and Light, which is involved in three joint ventures to mine coal. In addition, some utilities own coal reserves but hire independent firms to operate the mine.

The role of electric utilities, especially in the West, adds another dimension to competition in the coal industry. Given a utility's preference toward assuring the raw material requirements of coal-fired boilers, the price of coal offered under a supply contract should not exceed the cost which the utility would incur if it

mined coal itself. Experience in mining coal from captive mines may also increase the ability of electric utilities to bargain effectively with coal producers.

In 1974 the 4 largest electric utilities accounted for about 25 to 30 percent of total coal sales to the electrical sector. This level of buyer concentration is too low to suggest a monopsony problem. However, this level of buyer concentration comprises a potential countervailing power to any group seeking domination of the coal industry.

PRICES

During 1948-69 the average price per ton of coal (at the mine mouth) remained relatively stable. Since 1970, as shown in Table 4.3, the average price at the mine has increased substantially, rising over 90 percent during 1973-74 alone.

Table 4.3 also shows that labor costs rose 150 percent during 1968-75 while prices rose 300 percent. During this same period, output increased nearly 20 percent, and labor productivity decreased 24 percent. One of the most important aspects of Table 4.3 is that unit labor costs and average mine prices increased by nearly the same amount during 1968-73. In 1974-75, the huge increase in world oil prices and the uncertainty of supply stimulated a greatly increased demand for coal. In turn, this greater demand contributed to substantially higher coal prices.

The higher coal prices during 1974-75 do not, by themselves, imply a non-competitive market. In a competitive industry, price will rise in response to increased demand or increased costs. In the short run, because of the time required to open or expand new mines, increases in coal production may be constrained. If most mines are operating below capacity, then one would expect those mines to be able to supply relatively large amounts of coal without incurring proportionately higher costs. However, if most mines are operating at near capacity, then one would expect additional coal output to be relatively low and prices to rise as firms allocate their relatively scarce supplies to the highest bidders.

While higher prices for coal in response to higher world oil prices can be consistent with competitive behavior in the coal industry, one would expect a competitive and well-functioning industry to expand output and eventually reduce price in response to the greater demand. There is evidence that this is happening.

TABLE 4.3

Labor Cost Per Ton, Price Per Ton
and Annual Coal Production
1968-1976

<u>Year</u>	<u>Labor Cost Per Ton</u>	<u>Average Price Per Ton (mine mouth)</u>	<u>Annual Output (million tons)</u>
1968	\$1.99	4.67	543
1969	2.14	4.99	561
1970	2.38	6.26	603
1971	2.62	7.07	552
1972	3.04	7.66	595
1973	3.32	8.53	592
1974	3.62	15.72	603
1975	5.11	19.23	640
1976 <u>a/</u>	<u>b/</u>	20.00	665

Source: Average Price Per Ton and Annual Output are from Bureau of Mines. To determine how labor cost per ton was computed see: Council on Wage and Price Stability: A Study of Coal Prices, March, 1976, page 37, footnote c.

a/ Preliminary

b/ Unavailable

During 1974-76, coal production increased 10 percent and mining industry employment rose 30 percent. This increase in employment occurred despite a substantial increase in hourly earnings of coal miners. Adjusted for inflation, these earnings increased 6.3 percent during 1974-75. ^{6/} Furthermore, during 1975, the coal industry could have produced only an additional 44 million tons over the 648 million tons actually produced. Thus, these Bureau of Mines estimates suggest that, while 1974 production was lowered due to work stoppages and other factors, the coal industry operated close to full capacity during 1975.

The course of coal prices during 1974-76 also suggests a competitive market. The price data in Table 4.3 demonstrate that revenues to coal producers have increased dramatically: during 1973-76, average revenues more than doubled. But these data fail to allow for inflation and the rise in price of competing fuel sources.

Adjusted for inflation, the cost of coal to electric utilities increased about 54 percent during 1973-76. ^{7/} Not during this same period, even under partial controls, the cost of oil to utilities rose 88 percent while natural gas costs more than doubled. ^{8/} Therefore, the price of coal to utilities, which account for some three-fourths of domestic coal purchases, has declined relative to the price of other fossil fuels.

These latter data reflect the terms of contracts signed over several years. To further check the behavior of coal prices, we examined a recently developed index of spot prices of coal sold to utilities. ^{9/} This index comprises a sensitive barometer of coal prices and coal market conditions in general. For comparison, we constructed an index of crude oil prices on the world market. The price of crude oil imports was chosen because it is: an uncontrolled price, a short-run or spot price, and generally sets the trend for all energy prices.

Each of these price indexes was constructed so that December, 1973 assumed a value of 100. Monthly values for each index are presented in Table 4.4.

The table indicates that the increase in coal prices followed the increase in crude oil prices with a lag of 6-10 months. For example, the original 1973 OPEC embargo and price hike led to sharply higher prices (landed costs) by early 1974. By February, the landed cost of crude oil was already at an unprecedented level. However, spot coal prices rose nearly 40 percent during

TABLE 4.4

Indexes of Spot Prices for Steam Coal Sold to Electric Utilities
 Versus Landed Cost of Imported Crude Oil, January, 1974 - May, 1977
 (1973 = 100)

Month	1974		1975		1976		1977	
	Coal	Crude Oil	Coal	Crude Oil	Coal	Crude Oil	Coal	Crude Oil
January	104.2	174.7	139.5	232.6	99.6	241.7	97.4	257.0
February	105.7	226.8	127.2	237.7	98.8	241.5	97.6	264.1
March	107.4	231.9	114.7	241.9	97.8	246.1	99.1	264.8
April	109.4	231.7	112.4	241.5	97.6	243.9	99.9	261.6
May	110.1	237.2	110.2	241.7	97.9	244.3	100.9	266.1
June	116.7	237.2	109.0	257.7	97.0	245.5		
July	121.7	232.2	106.6	255.5	97.2	246.1		
August	125.2	231.0	105.6	259.6	96.6	247.4		
September	130.4	228.2	103.4	255.7	96.9	245.4		
October	137.5	226.6	102.5	267.0	97.1	245.7		
November	136.2	228.2	99.9	273.9	97.1	245.4		
December	143.6	233.5	100.5	269.8	97.2	249.7		
Average	120.7	228.0	111.0	253.7	92.6	245.5		

Source: Spot coal price index from Bureau of Labor Statistics. Index of crude oil prices constructed from Federal Energy Administration data on landed cost of crude oil imports.

February-December, 1974 while the cost of imported oil increased only slightly. The coal strike in late 1974 appears to have stimulated purchases in the spot market.

The table also indicates that coal prices declined in 1975 and have remained relatively stable since then despite a continued rise in the cost of crude oil imports. Some of the decline in coal prices during 1975 was undoubtedly due to the recession during that year. Yet the decline appears to confirm the competitive nature of coal sales made in spot markets. For many manufactured goods and some primary commodities, prices tend not to fall significantly during recessions. As indicated in Table 4.4, spot coal prices were the same in December, 1975 as in December, 1973.

Footnotes References

- 1/ National Petroleum Council, U.S. Energy Outlook, p. 145.
- 2/ Thomas D. Duchesneau, Competition in the U.S. Energy Industry (Ballinger Publishing Company: Cambridge, Massachusetts, The Ford Foundation, 1975), p. 108.
- 3/ George F. Nielsen, New Coal Mine Development Plans to 1985 (Coal Age, February, 1977) n.p.
- 4/ Ibid.
- 5/ U.S. General Accounting Office, U.S. Coal Development-- Promises and Uncertainties (EMD-77-43, September 22, 1977), p. 4.16.
- 6/ Ibid., p. 4.6.
- 7/ Ibid., p. 2.8.
- 8/ Ibid.
- 9/ This spot price index was recently developed by the Bureau of Labor Statistics.

CHAPTER V

CONCLUSIONS

We conclude that it is unlikely that any firm or group of firms could dominate the coal industry on a national level in the foreseeable future. However, in the western markets, the situation is dynamic and requires the continued vigilance by the Federal Trade Commission and the Department of Justice, as well as by the Interior Department through its coal leasing program. This conclusion is based upon our analysis of the production concentration ratios presently existing in the coal industry and the concentration ratios pertaining to the ownership of coal reserves as well as an analysis of barriers to entry in the coal industry and recent trends in coal prices and their causes.

We examined the coal industry on a national basis as well as on the basis of separate Eastern-Appalachian, Central-Western, and Southwestern markets. Our analysis indicates that the coal industry is competitive on a national basis and in the Eastern-Appalachian Market. The situation in the western markets, however, is not as clear cut.

On a national basis, and for the Eastern-Appalachian Market, the concentration ratios for coal production and reserve ownership are well below the standards normally applied by antitrust authorities as warranting the presumption of a concentrated industry. For example, on a national basis, the top 4, 8, and 20 firms control about 25, 34, and 50 percent of production, respectively. A commonly used standard by antitrust authorities is that the four-firm concentration ratio must be above 50 percent before there is a presumption of monopoly power.

Far more important, however, are concentration ratios for reserve ownership since these are a indication of future competition in the industry. These are even lower than current production ratios. The top 4, 8, and 20 firms control 13, 18, and 25 percent of the total U.S. demonstrated reserve base. Another important factor pertaining to reserves is that the Federal Government owns about 40 percent of the reserve base. If Federal Government reserves were eliminated from the calculation, the concentration ratios for reserve ownership would be increased by about 40% and would be 19, 25, 35 percent for the top 4, 8, and 20 firms, respectively. With such a large ownership of coal reserves, however, the Federal Government has the ability to control the development of the coal industry to a great extent through its leasing procedures.

We found that the likelihood that any firm or group of firms can exercise market power is greatest in the Southwestern Market. Currently, the three largest producers account for approximately 95 percent of production. Two firms, Utah International, an affiliate of General Electric, and Peabody Coal Company, recently sold to a consortium of companies headed by Newmont Mining Company, account for approximately 88 percent of the total market output. The Southwestern Market accounted for only 2.4 percent of national production in 1975 and is unique in many respects. The level of future concentration in this market will depend to a large degree on Indian and Federal leasing policies since the three largest producers control only about 10 percent of total coal deposits. The Federal Government and Indian tribes control approximately 90 percent.

Additionally, we found that the potential for domination of a coal market by petroleum companies is greatest in the Central-Western Market. The effect of their participation, however, will be to reduce seller concentration in this market as measured by the four-firm concentration ratio, and could create a positive effect on the level of competition by 1985.

Petroleum firm participation in coal production and reserves is small, but growing. Petroleum firms have concentrated their investment activity in the Central-Western market. This activity is a relatively recent phenomenon. As a consequence, their reserve ownership is larger than their current production. However, petroleum companies, as a group, have announced plans to develop their western coal reserves faster than other industrial groups and, therefore, could control as much as 40 percent of Central-Western coal production by 1985. Nevertheless, this group is comprised of over 24 different companies. If expansion were to occur as rapidly as announced, the coal industry probably would be in a more competitive posture due to the number of firms involved.

Given the large amounts of coal controlled by the Federal Government in the Central-Western and Southwestern Markets, it appears that the criteria set forth in the Federal Coal Leasing Amendments Act of 1975 are sufficient to assure the competitive posture of these markets. For example, Section 8B of the act specifies that:

Within six months after the end of each fiscal year, the Secretary of the Interior shall submit to the Congress a report on the leasing and production of coal lands subject to

this Act during such fiscal year; a summary of management, supervision, and enforcement activities; and recommendations to the Congress for improvements in management, environmental safeguards, and amount of production in leasing and mining operations on coal lands subject to this Act. Each submission shall also contain a report by the Attorney General of the United States on competition in the coal and energy industries, including an analysis of whether the antitrust provisions of this Act and the antitrust laws are effective in preserving or promoting competition in the coal or energy industry. . . .

Additionally, Section 15 of the Act contains two passages directly applicable to the use of Federal coal lands to promote competition.

- (1) At each stage in the formulation and promulgation of rules and regulations concerning coal leasing pursuant to this Act, and at each stage in the issuance, renewal, and readjustment of coal leases under this Act, the Secretary of the Interior shall consult with and give due consideration to the views and advice of the Attorney General of the United States.
- (2) No coal lease may be issued, renewed, or readjusted under this Act until at least thirty days after the Secretary of the Interior notifies the Attorney General of the proposed issuance, renewal, or readjustment. Such notification shall contain such information as the Attorney General may require in order to advise the Secretary of the Interior as to whether such lease would create or maintain a situation inconsistent with the antitrust laws. If the Attorney General

advises the Secretary that a lease would create or maintain such a situation, the Secretary of the Interior may not issue such lease, nor may he renew or readjust such lease for a period not to exceed one year, as the case may be, unless he thereafter conducts a public hearing on the record in accordance with the Administrative Procedures Act and finds therein that such issuance, renewal, or readjustment is necessary to effectuate the purposes of this Act, that it is consistent with the public interest, and that there are no reasonable alternatives consistent with this Act, the antitrust laws, and the public interest.

By requiring the Department of Justice to monitor competition in the coal industry (and other energy industries), the Congress has already taken an important step to insure that future developments in the coal industry are properly monitored and, therefore, should be adequately informed on any developing problems involving competition.

CHAPTER VI

AGENCY COMMENTS

Comments on a draft of this report were solicited from the following agencies:

Department of Interior
Department of Justice
Federal Energy Administration
Federal Trade Commission
Office of Energy Policy and Planning, Executive Office
of the President

After October 1, 1977, comments were also solicited from the Department of Energy.

The specific comments of each agency are reprinted as an appendix to the report with the exceptions of: the Department of Justice, which had no comments; and the Federal Trade Commission, which provided oral comments. The comments of the Federal Trade Commission have been incorporated in this report wherever possible.

GENERAL COMMENTS AND CONCLUSIONS

Of the five agencies which offered comments, four were in general agreement with the conclusions of the report and/or characterized the report as informative and a useful contribution. For example, the Office of Energy Policy and Planning replied that the report provided useful information, data, and analysis and comprised a valuable contribution to the current debate on the state of competition in the energy industries. This office also noted, however, that there is still concern about what the future might bring and that the Administration has pledged to conduct further investigation.

In contrast to the other four agencies, the Department of Interior concluded that the report was inadequate. We shall deal first with the comments of the agencies which were in general agreement with the report; then we shall address the comments of the Department of the Interior.

COMMENTS BY THE DEPARTMENT OF ENERGY, FEDERAL ENERGY ADMINISTRATION, FEDERAL TRADE COMMISSION, AND OFFICE OF ENERGY POLICY AND PLANNING

Both the Department of Energy and the Office of Energy Policy and Planning recommended a definition of entry which

excluded expansion of capacity by existing firms. We have adopted their recommendation. The Department of Energy correctly noted that the scope of geographic markets tends to change over time. Our investigation substantiated this; however, we also found such variation to be modest and, for the period 1975-83 at least, available data indicated that the coal industry consisted of the three markets identified in Chapter III: the Eastern-Appalachian market, the Central-Western market, and the Southwestern market. In addition, since concentration ratios can change without alterations in the shape of markets by new entry, we also estimated future concentration of production levels for the Central-Western market, where most projected capacity expansion is expected to occur.

The Department of Energy also questioned the relevance of concentration ratios based on nationwide data given that coal markets are regional in scope. We presented concentration ratios on a national basis for two reasons. First, prior research showed that the long term trend in coal has been toward geographically larger markets. Conceivably, coal markets could become nationwide in the future. Second, and more importantly, the coal industry is national, in scope, i.e., many firms operate in more than one market, even though its component markets are regional.

The Federal Energy Administration advocated further discussion of the impact of recent labor agreements on productivity in the coal industry. We believe that this is an important issue, but a thorough examination of the decline in productivity in the coal industry is not the purpose of this report.

The Federal Trade Commission, in its oral comments, observed that recent developments have made the competition between coal and nuclear power more intense. This point was also stressed in our recent report on coal development. ^{1/} As a consequence, the control of both coal and uranium reserves by major energy firms (e.g., Utah International) may become a cause for future concern. The Federal Trade Commission also noted that some observers regarded production concentration ratios as an inadequate measure of competitive conditions in resource markets. Unlike manufacturing firms, coal companies' current market shares are largely determined by past contracts. Hence, what are needed are data on concentration of new coal contracts. We feel that concentration ratios of current production and of reserves accurately portrays the current and future picture. First, a firm's ability to secure new contracts is highly correlated with its ability to service existing contracts. Secondly, spot market sales

comprise about 20 percent of total coal market sales. Lastly, data on concentration of coal reserves, give an indication of which firms have the means to obtain new contracts. Of course, our report does not rely exclusively on concentration data, but also examines entry condition, announced expansion plans, and price behavior.

COMMENTS BY THE DEPARTMENT OF THE INTERIOR

The Department of Interior raised a variety of objections to our report. Their first was that concentration ratios based on production were misleading because small firms occasionally sold coal to large firms and such coal was sometimes resold. This occurs infrequently. Furthermore, computation of concentration ratios based on sales data reveal little difference. For example, for the nation in 1974, the four-firm concentration ratio was 26.6 percent based on production and 27.1 percent based on sales. Since production data are provided in greater detail, our concentration ratios are computed on that basis.

The Department of Interior also regards coal from captive mines as irrelevant to the operation of coal markets. We disagree with this position. Reliance on captive mines by electric utilities is substantial and increasing. Such reliance can affect market prices in three ways. First, it permits the utilities to be more expert in their spot market purchases and contract negotiations with coal producers. Second, the production of captive mines tends to lower marketed production by a comparable amount. Were such production to enter the market, prices would likely fall. Even the production of mines owned by steel firms can be a factor. In 1974, spot shortages of coal appeared to result in diversion of metallurgical coal to utility boilers. Third, about eighty percent of coal is marketed under long term contracts which have characteristics similar to captive sales. The concept of captive mines tends to set a ceiling on the price of coal since it offers the buyer of coal under long term contracts an alternative if he finds that coal can be self-produced at a lower cost. For these reasons, we include coal production from captive mines in calculating concentration ratios.

We had attributed the large increase in concentration during the 1950's to the decline of small firms, merger activity, and the depressed state of the coal industry. The Department of Interior attributes the rise in industry concentration to low cost residual fuel oil, artificially low natural gas prices, and local ordinances against burning coal. We agree that competition from oil and gas

reduced coal's share of energy markets and that local ordinances may have accelerated the decline of very small coal firms. All three factors may have resulted in the depressed state of the coal industry as noted above. The causes of the decline in coal's share of the energy market are discussed in our recent report. 2/

The Department of Interior believes that drawing conclusions about the effect of Federal leasing activity on competition, as our report does, is risky because available data on coal reserves are unreliable. We agree, as our recent testimony on coal leasing indicates. 3/ In that testimony, we also suggested that the Department of Interior take steps to improve the data, including a viable definition of maximizing economic recovery. Nonetheless, the apparent domination of the Federal Government over reserves of coal in Western markets is not likely to be altered by improved estimates of the reserve base. This subject will be discussed further in our forthcoming report on Western Coal Under Federal Lease.

The Department of Interior regarded our analysis of price behavior as inadequate because we did not identify F.O.B. mines prices as either spot or contract prices and because we ignored the impact of the 1975 recession.

Our revised report identifies the average prices in Table 4.3 as estimates, by the then Bureau of Mines, of average F.O.B. mine prices in the indicated years. Such prices are a combination of spot and market prices. In Table 4.4, we present an index of spot coal prices developed by the Bureau of Labor Statistics. This index is juxtaposed with a comparable index for crude oil import prices to show the impact of OPEC pricing policies on domestic coal demand.

The failure of the draft report to mention the recession as a factor in the decline of coal prices during 1975 has been corrected in the final report. However, many industries are characterized by stable or even rising prices during recessions. The decline of coal prices during 1975 therefore underscores the competitive nature of spot coal markets.

Footnote References

- 1/ General Accounting Office. U.S. Coal Development-- Promises and Uncertainties, op. cit., chapter 2.
- 2/ Ibid.
- 3/ Statement of Monte Canfield, Jr., before Committee on Energy and Natural Resources, U.S. Senate, Washington, D.C., October 25, 1977.
- 4/ U.S. General Accounting Office. U.S. Coal Development-- Promises and Uncertainties, op. cit., chapter 2.

APPENDIX

Page

1	Letter dated September 28, 1977, from the Assistant Administrator, Energy Resource Development, Federal Energy Administration	1.1
2	Letter dated September 30, 1977, from Office of Energy Policy and Planning, Executive Office of the President	2.1
3	Letter dated October 12, 1977, from Deputy Assistant Secretary Policy, Budget and Administration, United States Department of Interior	3.1
4	Letter dated October 13, 1977, from Energy Information Administration, Department of Energy	4.1



FEDERAL ENERGY ADMINISTRATION

WASHINGTON, D.C. 20461

SEP 28 1977

OFFICE OF THE ASSISTANT ADMINISTRATOR

Mr. Monte Canfield, Jr.
Director
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Canfield:

John F. O'Leary, Administrator of the Federal Energy Administration, has asked that I respond to your letter of September 22, 1977, asking for comments on the General Accounting Office's draft report entitled "The State of Competition in the Coal Industry."

We have reviewed the draft report and agree with the conclusions. Our comments on specific items follow.

Page II-9. In the discussion of productivity in underground mining, we suggest that mention be made of the fact that the addition of non-productive workers called for in the last two labor contracts between the Bituminous Coal Mine Operators and the United Mine Workers of America also contributed to the decrease in productivity.

Footnote b, Table 2.3, page II-16. The date of the Mineral Industry Survey is May 1975, not May 1976.

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On page IV-16, it is stated that "Coal delivered to electric utilities accounted for 86 percent of all coal purchases in 1976." Depending on whether coal exports are treated as a "coal purchase," we believe this value should be 60 or 75 percent, but not as high as 86 percent. The following is a summary of coal distribution in 1976 according to the Bureau of Mines:

1976 Coal Shipments

Utilities	455 million tons
Coke Plants	85 " "
Industrial/ Commercial	53 " "
Exports	57 " "
Other	15 " "
Total	<u>665 million tons</u>

Thank you for the opportunity to comment on this report.

Sincerely,



Leslie J. Goldman
Assistant Administrator
Energy Resource Development

**EXECUTIVE OFFICE OF THE PRESIDENT
ENERGY POLICY AND PLANNING
WASHINGTON, D.C. 20500**

September 30, 1977

Dear Mr. Canfield:

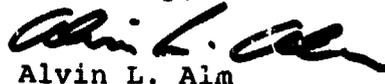
This letter responds on behalf of Secretary James R. Schlesinger to your request of September 22, 1977 for comments on GAO's draft report, "The State of Competition in the Coal Industry". I have been told that several offices at the Federal Energy Administration are providing you with some detailed comments; so, I will limit my remarks to a few general comments.

First, the report provides extremely useful information, statistical data, and analysis. Nonetheless, I would note that even if one accepts your general conclusion that the current market structure meets the usual static structural tests of workable competition, there is still concern about what the future will bring. This concern merits further investigation which the Administration has pledged to conduct.

In Chapter 2 and Chapter 4, internal expansion is equated with de novo expansion through entry. De novo expansion is almost always pro-competitive. Expansion by existing firms may or may not be pro-competitive. The two situations should be carefully distinguished.

We appreciate this opportunity to comment on your draft report. It makes a valuable contribution to the debate on competition in the energy industries. We look forward to continued interaction with GAO in this area when the new Department of Energy's programs in this area get underway.

Sincerely,


Alvin L. Alm

Mr. Monte Canfield, Jr.
Director, Energy and Minerals Division
U.S. General Accounting Office
Washington, D.C. 20548



United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

OCT 12 1977

Mr. Monte Canfield, Jr.
Director, Energy and Minerals Division
United States General Accounting Office
Washington, DC 20548

The GAO draft report entitled, "The State of Competition in the Coal Industry" proposes to analyze the state of competition in the United States coal industry. Their conclusion that it is unlikely that any firm or group of firms could dominate the coal industry on a national level in the foreseeable future is based upon the analysis of the production concentration ratios presently existing in the U.S. coal industry, the concentration ratios pertaining to the ownership of coal reserves, an analysis of barriers to entry in the coal industry, and recent trends in coal prices and their causes.

The major portion of the draft report relates to an analysis of concentration in the United States coal industry. A major finding of the study is that the concentration ratios for coal production and resource ownership are well below the standards normally applied by anti-trust authorities as a presumption of a concentrated industry. However, the report does not adequately cover the subjects of concentration ratios for coal production and reserve ownership, or of more valid tests to determine the state of competition.

For example, in Chapter 2, the subject of coal production concentration is discussed without an explicit definition of what constitutes a "concentration ratio." Many large coal companies not only produce their own coal but mine coal owned by others (contract) and also purchase and sell coal owned and mined by small producers (brokerage). Therefore the coal production of a particular firm included in the "concentration ratios" determination may neither be mined nor owned by the company. Moreover, the report advises caution in the analysis of nationwide "concentration ratios" when coal is neither bought nor sold in the national market. In fact, given high transportation costs relative to value, the markets for coal are often regional. Also, of the top ten leading coal producers in 1974, two firms mined coal for their own use (captive coal). In this instance, coal is one of the raw materials used in iron and steel making and thus, avoids the market place.

Table 2.1 of the report shows the 1950-76 increases in coal production "concentration ratios" for the three size categories: a 4-firm, 8-firm, and 20-firm industry. The decline in coal production from 516 million tons in 1950 to 412 million tons in 1960 and the drop in the participation of small producers (production below 100,000 tons per year) and merger activity were the principal reasons given for

by speculators and small independent producers. A Bureau of Land Management study appears to indicate that ownership of Federal leaseholds is fairly concentrated with twenty companies owning about two-thirds of the Federal leaseholds.

Any study of competitiveness should also examine pricing in the industry to determine whether the industry is competitive. In Chapter V of the study this subject is addressed. In view of the decline in coal prices since 1974 and the vital role of small firms in 1974, it is concluded that the price behavior of the industry is competitive. However, it is also concluded that if long term contracts and participation by large utilities increase in relative importance, the resultant decline in spot markets for coal may reduce the competitiveness of the coal industry.

We found the treatment of prices in the draft report to be inadequate. Firstly, part of the chapter talks about average price per ton but does not tell us if these are spot prices or long term contract prices. Furthermore, the report completely ignores the impact of the recent recession on prices since 1974. There is no doubt that the recession and stagnation in the steel industry reduced the demand for bituminous coal and in turn coal prices - clearly a sign of competitive forces.

The report treats oil/natural gas and coal as perfect substitutes in the production of electricity. This is not always the case. Hence, there would not be the incentive for petroleum firms that own coal to withhold coal to increase the value of oil production and reserves as is implied in the report.

In view of the GAO report's inadequate treatment of concentration ratios, reserve ownership concentration ratios, prices, and the substitutability of oil/natural gas in the production of electricity, we conclude that the report is inadequate in its present form.

Sincerely,



Deputy Assistant Secretary Policy, Budget
and Administration

the sharp increase in concentration since 1950. However, we believe that the major contributing factor for this increase in ratios was the competition from easily available low-cost residual fuel oil from foreign sources, and from artificially low natural gas prices. Also, prior to the passage of Federal environmental protection laws, many localities enacted ordinances that made continued use of coal impossible, thus causing a rapid decline in small coal firms.

In the draft report considerable important economic significance is placed upon "concentration ratios" of reserve ownership. The GAO report shows that the top twenty coal firms producing nearly one-half of the Nation's total coal in 1976 owned about 26 percent of the 1974 total U.S. demonstrated coal reserve base. It is estimated that 40 percent of the reserve base is located on Federal Government lands.

However, the report fails to address the fact that concentration ratios for reserve ownership do not give us any information concerning the potential of the companies to develop the reserves. For instance, if a company's coal reserves are scattered over several localities in a patchwork formation, it might not be economically feasible for that company to develop the reserves. Additionally, the reserve estimates are subject to considerable variance.

The report fails also to deal adequately with the way in which Federal ownership of coal reserves affects concentration ratios for reserve ownership. The report indicates that the quantity and percentage of coal reserves owned by the United States Government are essential elements in assessing the competitiveness of the United States coal industry since they reduce concentration of coal reserve ownership (and hence production) and reduce the level of barriers to entry into the industry. The report tells us that of the 145 billion tons of demonstrated reserves of coal owned by the Federal Government, 126 billion are still not leased. There are two reasons why one should be careful in using such an estimate to draw conclusions concerning the effect of Federal ownership on competitiveness in the coal industry. First, this estimate is probably inaccurate since it is possible that the amount of unleased coal on Federal lands is greater than 126 billion tons. Also, the reserve estimates include unrecoverable coal deposits located in national parks and other areas where mining would be prohibited. (The Fuels organization, Bureau of Mines, transferred to the Department of Energy on October 1, has the basic data for the demonstrated coal reserve base of the United States. These data are reported by geographical area and potential method of mining with various sulfur categories but without regard to ownership. It is believed that the Federal Trade Commission and the Bureau of Land Management are the two agencies that may supply the ownership data. This information was requested specifically in the GAO letter to the Secretary of the Interior, dated September 22, 1977.)

Any study of competition in the coal industry should also examine the question of ownership and concentration of Federal leaseholds. This is especially relevant in attempting to gain an insight into the competitiveness of the industry. Of the leased coal lands, the largest share is leased to public utilities and the second major group is comprised of the traditional mining groups. The oil and gas companies have about one-fifth of the leased acreage, and the remainder is owned



Department of Energy
Washington, D.C. 20461

October 13, 1977

Mr. Donald Forcier
Energy and Minerals Division
General Accounting Office
441 G Street, N.W.
Washington, D.C. 20548

Dear Mr. Forcier:

Pursuant to Messrs. McCormick and Greene meeting with you and Messrs. Hogarty and Valentine, enclosed are comments on GAO's study entitled "The State of Competition in the Coal Industry." Please feel free to call us for further elaboration/clarification if needed. Or, if you would prefer, a meeting could be arranged at your convenience.

Thank you for giving us the opportunity to review the report. Overall we found it informative and understandable.

Yours truly,

A handwritten signature in cursive script, appearing to read "Jerome R. Temchin".

Jerome R. Temchin
Energy Information Administration

Enclosure

Comments on "The State of Competition in the Coal Industry"
by members of the Energy Information Administration -
Office of Functional Analysis

1. Entry is defined to include expansion of capacity by firms in the market (pp. II-2 and IV-1). This seems an inappropriate definition and if maintained, should be justified.
2. On p. II-2, expansion by existing firms is said to lead to increased concentration. This is true only if there are asymmetrical increases in capacity by the larger firms. If all existing firms expanded capacity by the same percentage, concentration would be unchanged. If all firms expanded output by the same absolute quantity, concentration would fall.
3. A proper definition of a market has three dimensions - temporal, product, and geographic. When examining trends in concentration over time, there should be awareness that the appropriate market definition itself may change over time. Such a change might result from developments in transportation, for example, and, if not accounted for, may yield misleading calculations of trends. Coal markets have probably been changing over time, and concentration figures should recognize this.

The product dimension in the study seems to be characterized as steam coal, yet captive coal is included in the concentration figures. Doing the latter probably leads to overstating concentration.

The definition of geographic coal markets as regional seems well done, but it raises two related questions:

- a) If markets are regional, as discussed in Chapter 3, what is the rationale and meaning of discussing concentration on a national basis?
- b) Methodologically, it is desirable first to define geographic markets and then to examine concentration within them. This process is reversed in Chapters 2 and 3 by first looking at concentration, and then defining markets.

4. The definition of entry barrier on p. IV-1, when read literally, is overly broad. For example, using the report's definition, rather low industry profit rates would be an entry barrier, but that is not the sort of "artificial" constraint that one ordinarily views as being a prohibiting barrier. Furthermore, the attribution given is misleading and out-of-context because this definition is stated but in fact rejected by the source cited in Footnote 2. (See Koch, p. 88.)

5. It is evident that a great deal of editing has gone into this paper. It reads roughly and there are many typographical and grammatical errors. Further, it is apparent that important developmental passages have been deleted. For example, p. JII-2 should give more description of the Ford Foundation geographic market definition procedure.

6. There is disparity between overall CR's in GAO's Table 2.3 and Table I-6 in our Competition Task Force (CTF) report entitled "Descriptive Statistics on Interfuel Integration":

	<u>CR4</u>	<u>CR8</u>	<u>CR20</u>
GAO	13.3	18.2	25.5
CTF	12.2	17.0	23.2 (CR18)

These discrepancies appear to be due mainly to different estimations used by CTF and GAO for one and two non-reporting (to FTC survey) firms, respectively. CTF's CR18 (instead of CR20) reflects the fact that the CTF's purpose was to compare concentrations between oil-owned coal and all coal, and there were only 18 oil firms with coal activity in 1974.

7. (p. III-4). If Best Available Control Technology is mandated, then high & low sulfur coal compete in the same market, and "effective" concentration will likely decline. Otherwise, low sulfur coal would itself delineate a market, and concentration may increase because of the low sulfur holdings of the 40 largest firms.

8. On pages II-7 and II-9, the link between MHSA and the Clean Air Act and advantages of strip mines should be clarified and made explicit.

9. Table 3.3 - The title of the table refers to a Central Western Market, but columns refer to the total U.S.

10. (p. IV-II). One plausible explanation offered for low production-to-reserve ratios for oil companies is that entry of these firms may have been by acquisition of undeveloped reserves rather than by acquisition of ongoing coal mines. This would seem an easy matter to verify, yet no attempt to do so appears.

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