

Coal industry resurgence attracts variety of new workers

Coal companies report no shortage of inexperienced applicants even in Western "coal boom" areas; favorable wages appear to be a major attraction for the new miners, who are younger, more educated than other miners and include a growing number of women

HAROLD WOOL

During the past three decades, the coal industry has experienced major cycles which have profoundly affected the structure of its labor force. Following severe cut-backs in jobs between 1950 and 1965, employment stabilized between 1965 and 1969, and then expanded steadily for the next 10 years. With the expansion, the industry's work force has become younger and has more years of education.

Coal mining remains one of the most hazardous occupations in the United States, although State and Federal legislation provide some protection. Yet, mining companies report no shortage of job applicants, and miners report a high incidence of job satisfaction, most often identifying "good pay" as a significant factor.

This article reports on recent and prospective employment trends in the coal industry, focusing on the unique characteristics of the work and workers in the industry.

Working conditions

With few exceptions, coal mining is conducted in areas which are beyond normal commuting distance from major urban centers. Of the Nation's 100 largest

Standard Metropolitan Statistical Areas, only two (Pittsburgh and Birmingham) have significant amounts of bituminous coal mining activity. In 1970, about one-half of all coal miners resided in rural areas (population under 2,500).¹

Coal mining is a highly mechanized operation, using complex, heavy equipment to provide safe access to the coal seams, to remove the coal from the seams, and then to load and transport the coal to a preparation plant for processing prior to shipment. The occupations or job tasks of coal mine production workers are correspondingly diverse, ranging from laborer and other entry level occupations, to skilled mechanics and electricians, and to responsible operative jobs such as continuous mining machine operators, roof bolters, and operators of coal-loading shovel equipment and drag-lines.

Until recently, underground coal mines had accounted for the major share of all U.S. coal production and, because of higher average unit labor requirements, for an even larger share of total coal mining employment. Despite the sharp surge in surface mining since the 1960's, underground miners still accounted for about three-fifths of the industry's employment in 1978. The underground mining environment is inherently unhealthy, hazardous, and difficult. Safeguards mandated under the Coal Mine Health and Safety Act of 1969 have done much to protect miners against some of the major hazards, such as roof falls, explosions, and high

Harold Wool is Program Director for Energy Manpower Research at The Conference Board. This article was adapted from Chapter V, "Labor Supply for Coal Mining," of his recent book, *The Labor Outlook for the Bituminous Coal Mining Industry* (Electric Power Research Institute, Palo Alto, Calif., 1980).

dust concentrations. However, these safeguards have failed to reduce the incidence of nonfatal disabling injuries since 1969, and—at about 50 per million hours of exposure for underground miners in 1978—the incidence of such injuries continues to be among the highest of any major industry.

Surface coal mining, like other heavy outdoor, construction-type activities, is subject to its own set of workplace hazards, including exposure to dust, temperature extremes, diesel and welding fumes, whole-body vibration, noise, and stress. Nevertheless, surface mining lacks the confining conditions and certain hazards of the underground mines, such as risks of roof cave-ins and explosions or the high gas concentrations. In 1978, the injury rate in surface mines, 16.5 per million hours, was about one-third of that occurring in deep mines.²

Job satisfaction high

In view of the inherently dangerous and “dirty” nature of most coal mining jobs, it would be reasonable to expect a relatively high degree of dissatisfaction among coal miners and a high incidence of associated job-related tensions. Survey evidence and results of interviews with coal mine company officials provide very little confirmation for this assumption.

- An analysis of a survey conducted by the Westinghouse Behavioral Services Center (for the National Institute for Occupational Safety and Health) to measure job stress in coal mining, concluded, “Focusing on average job stress, miners fared much better than other blue-collar workers in a large national sample of occupations and, in fact, miners were significantly less dissatisfied with their jobs.”³
- A study based on interviews with 124 coal miners employed in four West Virginia mines similarly reported a high incidence of job satisfaction among miners: “Ninety percent of the miners said they found their work satisfying, 84 percent said it gave them a sense of accomplishment and 72 percent said it was challenging. When asked about the negative aspects of their jobs, 42 percent of the miners described their work as tiring, 22 percent said it was frustrating, and 8 percent said it was boring.”⁴
- Additional insight on this question is provided by the results of a 10-percent sample survey of United Mine Workers of America members who had entered coal mine employment in 1975. When asked to identify major considerations in their decision to work in coal mining, miners cited “good pay” most frequently among six designated factors; it was ranked first by 35 percent of the respondents. However, an additional 24 percent—the next largest group—indicated that they “enjoyed” coal mining, and that this was the major consideration for them.⁵

Coal mining tends to be more self-paced and offers somewhat more variety of job tasks than assembly-line, machine-paced manufacturing jobs. Actual work time in deep mines is relatively short, in view of the time required for the trip from the mine portal to the actual work location and because of the interruptions inherent in the work operations. Recently, there have been good opportunities for advancement to more skilled jobs, including supervisory jobs. Finally, miners take pride in the fact that their work is physically challenging and risky. This, in turn, has contributed to a sense of team spirit and cohesiveness within work teams and among miners as a group.

Although it is evident that most coal miners do in fact take pride in their work, evidence also indicates that a dominant factor in their decisions to enter and remain in coal mining employment is the extrinsic or economic reward. In addition to the United Mine Workers survey data, this is illustrated by the results of the 1976 Westinghouse Behavioral Survey Center’s survey of coal miner attitudes, which included an item on the positive aspects of their jobs. The most frequently cited positive aspects, identified by 80 percent or more of the respondents, were those associated with economic rewards, that is, wages, “steady work,” and benefits such as vacations and medical care. A smaller proportion (70 percent) cited “type of work” as a positive aspect, while only a minority cited more intrinsic job aspects, such as “independence” or “holding a responsible job,” as a reason for liking their jobs.⁶

Attractive wages an employment incentive

Between 1969 and 1978 (following settlement of the national coal strike), employment in the bituminous coal industry increased by nearly 100,000 jobs, to 241,000, its highest level since the early 1950’s. Substantial gains were recorded in all major coal mining regions. This rebound was accompanied by a reversal in the coal industry labor market. The hiring rate of coal miners increased from a monthly average of 1.2 per 100 employees in 1965–69 to 1.5 per 100 in 1970–77, while the layoff rate fell to an average of 0.2 per 100—probably close to the irreducible minimum. A large volume of retirements among coal miners, resulting from the high average age of miners and from liberalized pension benefits, also contributed to increased hiring needs during this period.⁷

Companies experienced little difficulty in recruiting sufficient numbers of inexperienced personnel for entry-level jobs during 1970–78, although they did have problems attracting experienced personnel, particularly supervisory and skilled maintenance workers. Personnel officials of 15 major coal companies who were interviewed in the summer and fall of 1978, indicated that they had substantial lists of applicants for entry-

level jobs, even in areas of relatively rapid employment growth.

A major factor which facilitated recruitment of new entrants to coal mining has been the high wage structure of the industry. Average hourly earnings of production workers in coal mining have been among the highest of all industrial workers, exceeding the average for all manufacturing industries by 55 percent in 1978. Moreover, in view of the extensive opportunity for overtime work or for work on weekends or holidays at premium rates, the difference in full-time annual earnings has been even greater than suggested by these comparisons.

A direct measure of the earnings incentive associated with transfer to a coal mining job is provided by comparing the prior earnings of workers who entered coal mining between 1973 and 1975 with those of workers who were employed in coal mining in both of these years.⁸ The following tabulation presents the 1973 earnings of persons employed in coal mining in 1975, by industry and age in 1973:

	<i>Coal mining</i>	<i>Other industries</i>	<i>Ratio</i>
All miners	\$11,981	\$6,807	1.76
16-24 years	9,377	4,472	2.10
25-34 years	11,456	7,579	1.51
35-44 years	12,521	8,652	1.45
45-54 years	12,895	9,243	1.45

The 1973 earnings of those who entered the industry during 1974-75 (new entrants) were \$6,807, compared with \$11,981 for those who were employed in coal mining in both years. Comparisons by age groups indicate that younger workers, age 16 to 24, who entered coal mining from other jobs, experienced a much greater improvement in their earnings than did those in older age groups. This is particularly significant because about one-half of the entrants into coal mining during these years were men under age 25. These comparisons are probably influenced, to some extent, by differences in the number of hours and days worked on prior jobs for these younger entrants, compared with those employed as coal miners, as well as by the sharp contrast in pay levels between most unskilled entry-level jobs and jobs provided in the coal industry.

Favorable wage differentials have encouraged the movement of many workers into coal mining from other industries and occupations. Based on our analysis of a sample of social security records, more than 57,000 workers, or nearly three-fifths of those who entered bituminous coal mining during 1971-75 had been previously employed in other industries. An additional 35,000 had been either out of the labor force, unemployed, or in certain categories of employment not covered by social security. Finally, about 4,600 entered or

reentered coal mining after military service. Entrants came from a relatively broad age spectrum: about one-half were under age 25; however, nearly one-fourth were 35 years or older, and consisted largely of those transferring from other industries.

The expansion of the coal mine work force during the 1970's was also greatly facilitated by the adverse trend in general labor market conditions during this period. The Arab oil embargo and accompanying inflation in oil prices in 1974-75, which stimulated a rapid increase in coal production and employment, had also been a major contributing factor in the economic recession. Hence, at the very time that coal mine hiring was being accelerated, large numbers of additional workers became available for these jobs as a result of large-scale layoffs and curtailed hiring in other industries.

Profile of recent entrants

The expansion of coal mining employment has been accompanied by dramatic changes in the composition of its labor force—in its age distribution, experience level, education, and related characteristics—and has also seen a potentially significant breakthrough in terms of the role played by women in this traditionally male-dominated industry.

Influx of younger men. Since 1970, there has been a major shift in the age of mine workers. The following tabulation, based on social security records, shows the age distribution of men employed in coal mining in 1969-70 (average) and in 1975:⁹

<i>Age group</i>	<i>1969-70</i>	<i>1975</i>
16 to 24	11.1	20.0
25 to 34	19.0	30.2
35 to 44	19.1	19.1
45 to 54	29.5	17.9
55 to 64	18.8	10.9
65 and over	2.5	1.0

The proportion of male miners under age 25 nearly doubled, reaching 21 percent in 1975, as a result of the large volume of new hiring during this period. There was also a large increase in the percentage of men age 25 to 34, from 19 percent to 30 percent. At the same time, the percentage of miners age 45 years and over dropped sharply, from about 50 percent to 30 percent, in part because of retirements of older miners. As a result of these shifts, the median age of coal mine workers dropped by about 10 years in this 5-year span, from 45 years in 1970 to 35 years in 1975.

These changes were paralleled by a corresponding reduction in the experience level of the coal mining work force. Between 1969 and 1974, the proportion of workers with less than 4 years of experience rose from 30 percent to 48 percent of the total, with a corresponding

reduction in the proportion with 4 or more years of experience. As a result, the number of coal mining employees with less than 4 years of experience more than doubled, while the number with 4 years or more of experience remained unchanged. The immediate effects of this drastic reduction in the age and experience level of workers in the industry was a new requirement for systematic training of new workers. Traditionally, the industry had relied on informal on-the-job training methods under which new miners were assigned to work with more experienced workers, often a relative. This approach no longer was satisfactory, both as a result of the large-scale influx of inexperienced miners and of legislation requiring formal health and safety training.

Educational attainment higher. Most coal mining occupations traditionally required little if any, formal education. Rather, characteristics such as physical condition and reliability combined with basic mechanical aptitudes had been more relevant. This was reflected in the past low educational attainment of coal mine employees. In 1970, fewer than 30 percent of all coal mine employees had completed at least 4 years of high school, compared with 59 percent for all employed men age 16 and over.¹⁰ The following tabulation shows the educational attainment of bituminous coal industry employees in 1970:

<i>Education</i>	<i>Percent</i>
Less than high school	52.6
Some high school	18.0
High school graduate	23.5
Some college or college graduate	5.9

Although directly comparable statistics are not available for post-1970 periods, it is clear that the flow of younger men into the industry has been accompanied by a significant increase in the educational level of the work force. Among entrants into coal mining jobs included in the 1975 United Mine Workers survey, nearly 73 percent reported an educational attainment of at least 4 years of high school; about 17 percent had completed some college work, and an additional 15 percent had taken some post-secondary technical training.¹¹ Similarly, the 1976 Westinghouse survey indicated that nearly one-half of all miners were high school graduates, in contrast with the fewer than 30 percent reported in the 1970 Census.¹²

The much higher educational attainment of recent entrants into coal mining can be attributed, in part, to the overall increase in educational level of the labor force during this period, as younger workers with more formal schooling have replaced older workers whose formal education was very limited. Thus, in 5 years, the median length of schooling of all male blue-collar work-

ers increased by nearly one-half year, from 11.8 years in 1970 to 12.2 years in 1975, according to Current Population Survey data.¹³ However, the influx of better-educated workers into coal mining during this period also reflects the favorable competitive position of this industry in the labor market, a result of its high wage structure and expanding employment opportunities.

This development is considered a challenge and opportunity by some industry personnel officials because it has brought into coal mining individuals with greater potential for advancement into the industry's growing number of skilled and technical jobs, and into its supervisory ranks. However, the higher level of education has also been regarded as a contributing factor to the increase in rank-and-file militance and to related problems of worker discipline, which have emerged in recent years.¹⁴

Women. Coal mining, like other types of heavy and dangerous work, has traditionally been considered a "man's industry." Women accounted for only about 1.5 percent of total employees in both 1960 and 1970, and 2.1 percent in 1975. Occupationally, women had been predominantly employed in the lower ranking office jobs and in routine service functions, such as cleaning. Based on reports submitted in 1975 to the Equal Employment Opportunity Commission by companies with 100 employees or more, about 87 percent of all women were in office clerical and service-type jobs; about 7 percent were in higher level salaried jobs, including officials, managers, professionals, and technicians; and 5 percent were in blue-collar jobs—usually in the lowest level laborer category. (See table 1.) Since 1975, a number of developments combined to accelerate the pace of hiring of women in the coal industry. The increased readiness of women to demand entry into a wide range of higher wage occupations previously reserved exclusively for men has been aided by a number of successful legal actions filed under Federal or State equal em-

Table 1. Occupations of women in the bituminous coal mining industry, 1975

Characteristic	All employees	Women employees	
		Number	Percent
Total in reporting companies	131,441	2,814	2.1
White-collar workers	25,251	2,504	9.9
Managers and officials	15,640	70	0.4
Professionals	2,105	74	3.5
Technicians	2,704	80	3.0
Clerical and sales workers	4,802	2,280	47.5
Blue-collar workers	105,412	142	0.1
Crafts	40,080	30	0.1
Operators	42,060	19	0.1
Laborers	23,272	93	0.4
Service workers	778	168	21.6

Source: U.S. Equal Employment Opportunity Commission.

ployment opportunity laws.

Employment of women in coal mining doubled between 1975 and 1979, and their proportion of total employees increased at an average increment of 0.4 percent per year. This contrasts with an average gain of only 0.1 percent per year in the preceding 5-year period, 1970–75. The following tabulation, based on Bureau of Labor Statistics data, shows the employment gains of women since 1970 (annual averages, except 1978):

<i>Year</i>	<i>Number</i>	<i>Percent</i>
1970	2,400	1.7
1975	4,500	2.1
1976	5,600	2.5
1977	6,400	2.9
1978 (June)	8,400	3.3
1979	9,200	3.6

These gains have been accomplished—at least in part—by the entry of women into production workers coal mining positions, both in underground and surface mines. Corroboration of this trend is provided by data on the number of medical examinations, which are mandatory for new underground miners. According to the National Institute for Occupational Safety and Health, the first such examination for a female coal miner was recorded in 1973, but since then, the cumulative number of such examinations for women rose to 992 in July 1977, to about 2,000 in September 1978, and to 2,574 by June 1979.¹⁵ Not all of these women were hired by coal companies, and of those who were, a substantial proportion probably subsequently left their jobs. Nevertheless, even after allowance for these factors, it appears that of the 8,500 women employed in the bituminous coal industry in early 1979, more than 1,000 were actually working as “miners,” that is as production workers or in related blue-collar jobs.

Only about 4 percent of all coal industry employees in 1975 were black or members of other minority groups. As in most other industries, minority group members in coal industry jobs are disproportionately employed in the less skilled occupations. This pattern is most pronounced among white-collar jobs, and less so in blue-collar jobs, where advancement to more skilled craft jobs is often governed by union seniority and job-bidding rules. (See table 2.)

Continued employment growth expected

In the coming decade, labor requirements for the bituminous coal industry are expected to grow from an actual employment level of about 214,000 in 1977 to about 325,000 in 1990.¹⁶ Attainment of this employment level would, in turn, require the recruitment of an average of about 45,000 new workers per year, including those needed to replace workers leaving the industry because of retirement or other reasons.

Table 2. Occupations of minorities in the bituminous coal mining industry, 1975

Characteristics	All employees	Minority employees	
		Number	Percent
Total in reporting companies	131,441	5,405	4.1
White-collar workers	25,251	539	2.1
Officials and managers	15,640	219	1.4
Professionals	2,105	46	2.2
Technicians	2,704	43	1.6
Clerical and sales workers	4,802	231	4.8
Blue-collar workers	105,412	4,797	4.6
Craft workers	40,080	1,700	4.2
Operatives	42,060	1,963	4.7
Laborers	23,272	1,134	4.9
Service workers	778	69	8.9

SOURCE: U.S. Equal Employment Opportunity Commission.

When these projected requirements are compared to the aggregate size and growth trend of the total labor force, it seems unlikely that the coal industry will experience any significant problems recruiting workers. The U.S. civilian labor force, which totaled more than 100 million in 1978, is expected to grow to about 119 million by 1990, according to “intermediate-level” projections of the Bureau of Labor Statistics.¹⁷ Thus, labor requirements for the coal industry will continue to constitute only a minute fraction—less than 0.3 percent—of the potential total national supply of workers. General labor recruitment problems seem even less probable if allowance is made for the coal industry’s high wage structure and for the very modest qualification standards for entry into most coal mining jobs.

Nevertheless, shortages may emerge in some areas and in some occupations. This could stem from the highly uneven geographic pattern of growth for the coal industry in the period to 1990. In contrast to an overall projected employment growth of about 55 percent between 1975 and 1990, labor requirements in bituminous coal mining are expected to grow nearly sixfold in the Western, Great Plains, and Rocky Mountain regions, and about threefold in the Midwestern region. Very little net employment growth is expected in most of the Appalachian coal-mining areas.

The Western areas of projected rapid growth in coal mine employment are generally sparsely settled, with limited local labor reserves and low current unemployment, in contrast to the sizable labor reserves in many of the Eastern coal mining regions. Although employers have not reported significant difficulty in recruiting workers for entry-level coal mining jobs, they have reported problems in developing an adequate supply of experienced supervisors and skilled mechanics. Thus, coal employment needs now projected for these regions could be constrained by some labor supply problems, resulting in upward pressures on labor costs.

Recent developments, including legislation providing for development of a massive coal-based synthetic fuel industry, may increase coal demand in the coming decade above the levels anticipated in this report. These

developments may have sizable impacts on labor demand-supply conditions in some coal mining communities, but data are not yet available to attempt to quantify such impacts. □

— FOOTNOTES —

¹ 1970 *Census of Population, Subject Report: Industrial Characteristics*, PC (2)-7B (Washington, Bureau of the Census, 1973).

² *Mine Injuries and Worktime, Quarterly* (U.S. Department of Labor, Mine Safety and Health Administration, 1978), table 1 and *Statistical Abstract of the United States, 1977* (Washington, Government Printing Office, 1977), p. 422.

³ Cited by Ronald Althouse and Joseph J. Hurrell, Jr. in *An Analysis of Job Stress in Coal Mining* (U.S. Department of Health, Education and Welfare, National Institute of Occupational Safety and Health, 1977), #77-217.

⁴ Jeanne M. Brett and Stephen B. Goldberg, *Wildcat Strikes in the Bituminous Coal Industry: A Preliminary Report* (Evanston, Ill., Northwestern University, Graduate School of Management, 1978).

⁵ "UMWA Survey of 1976 Coal Mine Workers," in *Forecast of Employment and Training in the Coal Mining Industry, 1980-2000* (Salt Lake City, Utah, John Short and Associates, Inc., 1979), p. 56.

⁶ C. Michael Pfeifer, Joseph L. Stefanski, and Craig B. Grether, *Psychological, Behavioral and Organizational Factors Affecting Coal Miner Safety and Health* (Columbia, Md., Westinghouse Behavioral Services Center, 1976), tables 23 and 49.

⁷ *Determination of Labor Management Requirements to Meet the Goals of Project Independence* (Washington, Kramer Associates, Inc., 1975), ch. IV.

⁸ Data are from a 10-percent sample of social security records of male workers in the bituminous coal industry in 1971, 1973, and 1975.

⁹ Data for 1969-70 are based on analysis of a 1-percent sample of social security's continuous work history records of male employees

whose primary earnings were from the bituminous coal industry. (From unpublished tabulations by John Short and Associates.) Data for 1975 are based on analysis of a 10-percent sample of social security records of men whose primary earnings in the first quarter of 1975 were from the bituminous coal industry. (From tabulations prepared for The Conference Board by the U.S. Department of Commerce, Bureau of Economic Analysis.)

¹⁰ "UMWA Survey . . .," p. 51.

¹¹ *Ibid.*, p. 54.

¹² Althouse and Hurrell, *Analysis of Stress in Coal Mining*, p. 15.

¹³ *Employment and Training Report of the President, 1978* (Washington, U.S. Department of Labor, Employment and Training Administration, 1978), table B-12.

¹⁴ See, for example, Everett M. Kassalow "Labor management relations and the coal industry," *Monthly Labor Review*, May 1979, pp. 23-27.

¹⁵ *Coal Mining Women's Support Team News* (Oak Ridge, Tenn., Coal Employment Project, September-October 1978). Data for June 1979 provided by Betty Jean Hall, Director, Coal Employment Project.

¹⁶ Projections to 1990 presented in chapter 4 of Harold Wool and John B. Ostbo, *The Labor Outlook for the Bituminous Coal Mining Industry* (Palo Alto, Calif., The Electric Power Research Institute, 1980).

¹⁷ Paul O. Flaim and Howard N Fullerton, Jr., "Labor force projections to 1990: three possible paths," *Monthly Labor Review*, December 1979, pp. 25-35.