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Characterization of the 1986 Coal Mining Workforce

By Shail J. Butani and Ann M. Bartholomew

UNITED STATES DEPARTMENT OF THE INTERIOR

Information Circular 9192

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UNITED STATES DEPARTMENT OF THE INTERIOR
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CHARACTERIZATION OF THE 1986 COAL MINING WORKFORCE

By Shail J. Butani[1] and Ann M. Bartholomew [2]

ABSTRACT

In 1986, the Bureau of Mines conducted a probability sample survey, Mining Industry Population Survey, to measure such employee characteristics as occupation; principal equipment operated; work location at the mine; present job, present company, and total mining experience; job-related training during the last 2 yr; age; sex; race; and education. The population estimates are necessary to properly analyze the Mine Safety and Health Administration (MSHA) injury (includes illness and fatality data) statistics; that is, to compare and contrast injury rates for various subpopulations in order to identify those groups that are exhibiting higher than average injury rates.

This report uses the survey's results to characterize the U.S. coal mining workforce from March through September 1986. A companion report, Information Circular (IC) 9193, "Characterization of the 1986 Metal and Nonmetal Mining Workforce," provides similar information for the U.S. metal and nonmetal mining industry.

[1]Mathematical statistician (now with Bureau of Labor Statistics, Washington, DC).
[2]Statistical assistant.
Twin Cities Research Center, Bureau of Mines, Minneapolis, MN.

INTRODUCTION

According to the occupational safety and health (OSH) statistics published annually by the U.S. Department of Labor, Bureau of Labor Statistics, the mining industry (excluding oil and gas extraction) always has had one of the highest injury incidence rates among the major industry divisions. One of the primary objectives of the Bureau of Mines is to conduct research in the area of health and safety of the nation's miners, aimed at reducing the incidence rate of work-related injuries, (includes illnesses and fatalities) in the domestic mining industry. In order to reduce the overall incidence rate, the Bureau needs to identify which groups or subpopulations of the workforce are exhibiting higher than average incidence rates.

To identify the high-risk groups, information about the injured workers and about the entire workforce is required. Present regulations permit MSHA to collect information on all mine injuries requiring medical attention. Hence, a data base containing various characteristics on the *injured* workforce is available. Since similar information about the *entire* workforce was not available, the Bureau conducted a probability sample survey called the Mining Industry Population Survey (MIPS), also known as the demographics survey, to collect the necessary data. The 1986 survey measured the following characteristics: job title or occupation, principal equipment operated, work location at mine, experience at present job, experience at present company, total mining experience, job-related training during last 2 yr, age, sex, race, and education. This demographics survey provided information about the population at risk and will aid research in pinpointing the hazardous segments of the population, as illustrated by the following example.

From MSHA's coal injury data base, it is known that 12,765 males and 197 females working in the U.S. coal mining industry were injured in 1986. If information about the population at risk (i.e., the number of male and female workers for the coal industry in 1986) is not known, then it is not valid to draw the conclusion that male miners are at a much higher injury risk than female miners. The estimates from the demographics survey show that there were a total of 144,859 male workers and 6,119 female workers (table E-23) employed in U.S. coal mining in 1986. Of these workers, the nonoffice workforce identified by occupation or job title consists of 142,363 males and 3,328 females (table E-8). The reason for excluding office workers from the analysis is to account for some of the obvious difference in job risk. It should be noted that in the office worker category, only 2 pct are males and 46 pct are females (table E-23).

The added information on the population puts the injury statistics in a better perspective, as shown in table 1.

Table 1.—Population and injury statistics for 1986 coal mining sector

	Population statistics		Injury statistics			
	Workers	pct	Injuries	pct	Lost workdays	pct
Male	142,363	97.7	12,765	98.5	302,841	97.9
Female	3,328	2.3	197	1.5	6,374	2.1
Total	145,691	100.0	12,962	100.0	309,215	100.0

Since the difference between the population and injury distribution is relatively large, it would be interesting to further investigate the source of variation. Could it be due to variations in the job mix by sex?

Hence, the present research will aid in finding solutions to reduce the injury incidence rates for the high-risk groups. That is, the collected information will be used to compare and contrast the demographics composition of the hazardous groups with those of the safer groups. Thus, through present research, the differences and similarities between the two groups can be defined.

The purpose of this report is to provide the U.S. coal mining population estimates for March through September 1986 by various characteristics. This information is essential to performing the injury data analysis which is the ultimate goal of the survey.

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The authors thank the officials of the U.S. Department of Labor, MSHA, for submitting the MIPS package to the Office of Management and Budget for its clearance to collect the data. Special thanks go to Kathy Snyder, public affairs specialist, Office of Information and Public Affairs, MSHA, for initiating the study, and to Edwin Thomasson, research liaison officer, Technical Support, MSHA, for his continuous effort and support.

SURVEY METHODOLOGY

POPULATION

The MIPS covered all workers employed in the anthracite coal (SIC[3] 111), bituminous coal (SIC 121), metal (SIC 101-106, 109, 281), stone (SIC 141, 142, 324, 327), sand and gravel (SIC 144), and nonmetal (SIC 131, 145, 147, 149, 289, 299) mining industries of the United States during the period March through September 1986. This report gives estimates only for the coal mining (SIC 111 and 121) sector; IC 9193 gives estimates for the 1986 metal and nonmetal mining sector.

The information pertaining to the mine employees included in the survey was collected through the mine operators, because a comprehensive sampling frame (name and address file) of the workers in mine establishments was not available, and cost considerations prohibited the data collection through personal visits. The number of universe units (establishments under MSHA's jurisdiction) covered by the scope of this survey

[3]The Standard Industrial Classification (SIC) was revised in 1987; the industry group numbers used here are those in effect at the time of the MIPS.

was approximately 18,350, with a total employment level of about 350,000. The number of establishments and employment for the coal mining sector was about 7,750 and 160,000, respectively. The scope of the data for the employees covered by this survey is the same as that of the data collected by MSHA form 7000–1 for the mine accidents, injuries, illnesses, and fatalities, and MSHA form 7000–2 for quarterly mine employment and coal production. The collection of the fundamental statistics reported on these two forms is required by law (30 U.S.C. 813; 30 CFR 50).

SAMPLE

The principal feature of the survey sample design was its use of two-stage stratified random sampling. The primary sampling units (first stage) were the mine establishments; the secondary sampling units were employees within each of the chosen mine establishments. The characteristics used to stratify the primary units were the industry (anthracite coal, bituminous coal, metal, stone, sand and gravel, nonmetal); mine type (underground, surface, plant or mill); employment size class (1–19, 20–49, 50–99, 100–249, 250–499, 500–999, 1,000 and above); and status code (active, intermittent). Since the first three stratification characteristics are highly correlated with the characteristics that the survey was to measure, use of stratified sampling increased the efficiency of the sample design and thus resulted in a smaller required sample size. The fourth characteristic, status code, was chosen so that nonresponse adjustment could be made within more homogenous groups. This is desirable because proportionately higher numbers of nonmailable, out-of-business, refusal, etc., responses are reported from intermittent mine establishments than from active mine establishments.

The sampling frame used for this survey was the 1985 preliminary address and employment file maintained by MSHA. A probability sample of 1,476 coal establishments from a universe of 7,733 coal mining establishments was selected by stratifying the frame as previously described and using a systematic sampling procedure with a random start for each stratum. The employees within an establishment were selected by using a systematic sampling procedure with a common random start for each employment size class.

A brief description of the sample allocation is as follows. For larger employment size classes, the allocation procedure placed all of the establishments on the frame in the sample as primary sampling units from which the employees were subsampled at a low frequency rate. As employment size class decreased, smaller and smaller proportions of the establishments were included as primary sampling units, but the employees within the establishments were subsampled at a higher frequency rate. The use of this procedure gave each employee, to the extent possible, about the same probability of inclusion in the sample, thus reducing the sampling variability. In order to limit the response burden for any one establishment, a maximum sample of 50 employees per establishment was selected.

DATA COLLECTION

The MIPS was conducted from March through September 1986 by mail questionnaire through the Bureau's Twin Cities (MN) Research Center. A reproduction of the original letter, followup letter, and the questionnaire bearing the Office of Management and Budget clearance number authorizing collection of the data are included in appendix F.

Table 2 gives a summary of the results for the coal mining sector from the original and followup mailings, as well as from telephone calls to the nonrespondents.

Table 2.—Demographics survey response status: 1986 coal mining sector

Industry	Population	Sample	Overall response		In-scope[1] records	Usable response	
			No.	pct		No.	pct
Anthracite coal	406	141	124	88	105	84	80
Bituminous coal	7,327	1,335	1,112	83	858	538	63
Total	7,733	1,476	1,236	84	963	622	65

[1] Nonrespondents + usables + refusals + unusables (excludes out-of-businesses, nonmailables, duplicates, temporary inactives, and new businesses under construction).

A brief description of the response terms follows:

Response code	*Description*
Nonrespondent	Received no response from the establishment.
Usable	Establishment provided usable data.
Refusal	Establishment refused to provide any data.
Unusable	Establishment provided data that were not in usable format.
Nonmailable	Establishment's address was either insufficient or wrong.
Duplicate	Data were combined with another establishment's data.
Out-of-business	Establishment was permanently closed.
New business	Establishment was in development stage.
Temporary inactive	Establishment was temporarily not operating.

As part of the data collection phase, all the returns were reviewed and edited for completeness and reasonableness of the data. Whenever there were inconsistencies, the respondents were called for reconciliation. Also, almost all of the respondents that had initially refused to participate in the survey were contacted by phone. Approximately 80 pct of these respondents ultimately supplied data. Adjustments for those mine establishments that did not supply the data, or supplied partial data, are explained in the "Estimation Procedures" section and in appendix C.

DATA CODING, ENTERING, AND EDITING

The returns underwent a very comprehensive review and editing process in order to (1) minimize the reporting differences among the respondents (establishments), (2) ensure consistency of coding among the individual worker entries, (3) ensure the accuracy of the data entry, and (4) ensure compatibility of occupation and equipment coding with the MSHA injury data base.

ESTIMATION PROCEDURES

In a simple random sampling plan, all units are sampled with the same sampling ratio. To derive the population estimates, the sample units are weighted (replicated) by the inverse

of the sampling ratio. Because of efficiency consideration, the data for this demographics study were collected using a complex survey design. Hence, the data for each worker, the ultimate sampling unit, were not equally weighted. Instead, the population estimates were derived by weighting data for each worker with the appropriate final weight of the data, which was the product of the following three factors: (1) the inverse of the sampling ratio with which the primary sampling unit (establishment) was sampled; (2) a nonresponse adjustment factor that was computed separately for each sampling stratum and assigned to all responding establishments in a stratum to account for those establishments in that stratum that did not respond; and (3) the inverse of the sampling ratio with which the secondary sampling units (workers) were selected. A detailed discussion of the different weights and estimation formulas are given in appendix C. In statistical terms, the survey's estimates of the population total were based on a Horvitz-Thompson estimator (*1*).[4]

No adjustment was made for partial nonresponse. That is, the characteristics that were left blank by the respondents were coded as unspecified and were, naturally, weighted by their appropriate final weight in computing the population estimates. The percentage unspecified for a particular characteristic gives the user an indication of the completeness of the schedules.

GROUPING OF CHARACTERISTICS

The original data base has detailed data for the characteristics mentioned below. For purposes of publication, the detailed data were combined into groups. Please contact the authors to obtain detailed data or a different grouping of the data for any or all of the characteristics.

Job Title and Principal Equipment Operated

Since the original data base has about 100 codes for each of these two categories (see appendixes A and B), the entries were combined into 20 to 25 groups. Similarities of the job title or principal equipment operated, and number of workers in each entry were two of the main criteria used in forming the groups.

Employment Size Class

The classes used for this characteristic are the standard size class definition used by MSHA. Because there were less than three mines for the size class having 1,000 or more employees, the estimates for this class were computed separately and then were combined with the estimates for employment size class 500 through 999 in order to protect the confidentiality of the mines as well as the workers. The combined size class is labeled as 500+.

Present Job, Present Company, and Total Mining Experience

The data for all three of these characteristics were coded only as the number of years. It was felt that data were not reliable enough to be accurate to the month. The groupings were formed to be as compatible as possible to the groupings used by MSHA for its injury statistics.

[4]Italic numbers in parentheses refer to items in the list of references preceding the appendixes at the end of this report.

Job-Related Training During the Last 2 Years

The grouping for this characteristic was formed to reflect the definite and logical intervals that various mine operators employ and that meets the need of the mine safety personnel. The most frequently reported number was 16 h for training during last 2 yr; this is because MSHA requires a minimum training of 8 h/yr. Also, MSHA and safety personnel are interested in knowing the percent of workers who receive no training. Hence, both 0 and 16 h were categorized separately.

Age

The groupings for age were formed to be about the same as what MSHA uses for their injury statistics.

RELIABILITY OF ESTIMATES

As stated in reference 2:

> All estimates derived from a sample survey are subject to sampling and nonsampling errors. Sampling errors occur because observations are made on a sample, not on the entire population. Estimates based on the different possible samples of the same size and sample design could differ. Nonsampling errors in the estimates can be attributed to many sources, e.g., inability to obtain information about all cases in the sample, mistakes in recording or coding the data, definitional difficulties, etc.

Nonsampling errors occur in a census as well as in a sample survey. As mentioned earlier, the completed forms underwent a very comprehensive review and edit process. This was primarily done to minimize the nonsampling errors.

In a probability sample the coefficients of variation (CV's), which are a measure of the sampling errors in the estimates, can be estimated from the survey data. CV's were calculated for the basic characteristics as part of the survey estimation process; the CV's as well as the corresponding estimates for number of workers are given in tables E-49 through E-56. The CV's for other estimates can also be derived if requested. The methodology used to compute the estimated CV's is given below.

By definition, the CV of any sample estimate is equal to the standard error of the estimate divided by the value of the estimate (*3*). In other words, it is a measure of relative variation. Because the survey data will be used by numerous researchers to measure different statistics (e.g., totals, means, medians, percentages) by various cross-classification categories, it was not feasible to use the exact formula for the standard error estimates. Hence, a generalized formula that approximated the exact formula and that was easy to implement for computing all the standard error estimates was developed. It should be noted that since the survey uses a complex sampling design, the usual variance, standard deviation, and standard error estimates computed by the software packages are no longer valid because they are based on simple random sample design. The reliability measures for this survey were computed by employing a random group variance technique. A brief description of it is given in appendix D and a detailed discussion is given in reference 4.

The purpose of producing a reliability measure for this report is to define the confidence interval or range that would include the comparable complete coverage value. For example, the total number of estimated truck drivers for the 1986 coal industry was 7,297 (table E-2 and E-50) with a CV of 4.6 pct

(table E-50). Based on this information, the standard error on the total number of truck drivers is 336 (estimate × CV = 7,297 × 0.046) and the 95-pct confidence interval is 6,625 to 7,969 (7,297 ± 2 × 336). This means that with 95 pct confidence it can be said that the interval 6,625 to 7,969 includes the total number of coal truck drivers that would have been obtained from a census of the frame.

It should be noted that normally the variance (square of the standard error) of a total pertaining to the combined two industries would be equal to the sum of the variances for each industry because the two industries were sampled independently. That is, the variance for the total number of truck drivers for the entire coal mining industry would be equal to the sum of the variances for the truck drivers in anthracite and bituminous coal mining industries. However, this methodology was not employed to compute the variance estimates for the combined two industries, instead, even for this estimate, the random group variance technique as described in appendix D was employed. This was primarily done, as mentioned previously, because the survey data will be used by numerous researchers to measure different statistics (other than totals) such as means, medians, percentages, etc., and for these statistics the variance for the combined two industries will not be the simple sum of the variances for each industry. Hence, for reasons of consistency and simplicity the random group variance estimator was used to compute all variances and thus CV estimates.

In general, the smaller the subpopulation size, the larger the variability in the estimates. Additionally, the larger the nonresponse, the less reliable the estimate may be. As mentioned earlier, nonresponse error is considered a nonsampling error. This error occurred more frequently for estimates of job-related training during the last 2 yr and total mine experience than for other variables because conceptually these variables are harder to report. Moreover, it is possible that the training estimates might be somewhat biased because many respondents filled in 16 h, the minimum number of hours required by MSHA over a 2-yr period.

VALIDATION OF ESTIMATES

Once the estimates were produced, they were validated for accuracy and reasonableness by several mining industry specialists. Additionally, the total employment for each industry was compared to an independent census conducted by MSHA, the results of which are reported in references 5 through 9. The injury experience report tabulates the injury-illness-fatality data reported to MSHA on form 7000-1 and employment data reported on form 7000-2. While the data base used to compile the statistics for this report contains detailed information for the injured victims, it does not contain similar information for the entire workforce. The breakdown of total employment is available only by type of coal mined, employment size class, and work location. Hence, the MIPS was conducted so that MSHA injury data could be analyzed in greater detail.

The data show that the overall employment figures from the two sources differed about 13 pct for coal industry, with the MSHA figures being higher than those of the demographics survey. The differences in the estimates are caused in part by differences in reporting, coverage period, definitions, and methodology, as explained below, for data comparison by employment size class and by work location.

When comparing distribution of workers by employment size class, the differences between the numbers in table E-1 of this report and MSHA data as stated in tables 4, 4A, and 4B of reference 9, are substantial. This is mainly due to the differences in definitions and methodology. The MIPS classification is based on total employment of an establishment as it existed when the respondents filled out the questionnaires. MSHA collects employment on an quarterly basis and for each quarter it is possible for the employment to be broken into a maximum of four different work locations; hence each establishment may have up to 16 different employment figures.

Per MSHA methodology, the size groups are classified according to the lowest numbered (primary) subunit's average employment of four quarters and *not on the total employment* of an establishment, as is the case with the MIPS. For example, if an establishment's annual average employment is 60, but the employment for the primary subunit, say underground, is 15, then the establishment per MSHA's methodology is in size class 1 through 19, whereas according to the MIPS procedure it is in size class 50 through 99. It is for this reason the average employment per operation as stated in table 4 of reference 9 is 4.6 for size class 1-4. It should be noted that the MSHA classification overestimates the employment in smaller size classes.

In view of the above, the injury data as published in references 5 through 9 by size class should not be analyzed against the MIPS employment size class data. Instead, the analyst needs to retabulate the MSHA injury data from the original data tapes so that the size class definition corresponds to the MIPS.

Also, a large difference existed between MIPS and MSHA figures for employment distribution by work location. This is primarily due to differences in reporting. The employment reported to MSHA every quarter is in aggregate numbers for each work location (maximum of four). Generally, this type of reporting results in gross approximations in the breakdown of variables like employment. For the MIPS data, the work location was reported for each worker in the sample, in the same manner as it is reported to MSHA on form 7000-1 for each injured worker. It should be noted that the data on work location for individual worker is known with more specificity than for the whole population. Hence, it is appropriate to analyze the survey work location data with MSHA injury statistics.

Additionally, a small portion of the difference in the two estimates is due to the job title category of office workers. The MIPS underestimated the number of employees in this category because many respondents assumed that these workers very seldom incur injuries and therefore were not to be reported. For the purposes of accident analysis, the office workers are to be excluded because of the obvious difference in the injury risk. Hence, the difference in counts of office workers does not make any difference.

SUMMARY OF MAJOR FINDINGS

The findings of the survey by various cross classifications are given in tables E-1 through E-48; tables E-49 through E-56 give reliability estimates for the basic characteristics and a detailed discussion of their use is given in the "Reliability of Estimates" section. If desired, the estimates by some other classification criteria including more detailed estimates (e.g.,

distribution of workers by age and experience at present company in the bituminous coal industry working at the underground location) can be derived from the original data base. The following findings are based on the data for the entire 1986 coal mining workforce.

- The total estimated workforce for the anthracite coal industry was approximately 2,600 while that of bituminous coal was 149,200 (table E-1). The data also indicate that 39 pct of the anthracite coal workforce was employed in establishments with 19 or less employees as compared with 11 pct for the bituminous coal industry.
- The total estimated workforce for the coal industry was approximately 151,800, of which 15 pct were employed as laborers-miners-utility-service persons, another 15 pct as mechanics-welders-oilers-machinists, and 7 pct as dozer-heavy-mobile equipment operators (table E-2). Each of the remaining occupation groupings had fewer than 7 pct of the employees.
- The distribution of the coal workforce was underground mine, 46 pct; surface at underground mine, 6 pct; surface mine, 34 pct; plant or mill, 9 pct; and office, 5 pct (table E-4). Also, the distribution for work locations underground mine, surface mine, and plant or mill for anthracite coal industry was vastly different from that of bituminous coal.
- The median experience at the present company ranged from 5 yr for truck drivers to 11 yr for longwall operators and working foremen (table E-19).
- Mean hours of training during the last 2 yr ranged from 23 for scoop tractor operators to 63 for working foremen (table E-21).
- Of the female employees, 46 pct had the job title category of office worker, compared with 2 pct of the males (table E-23).
- Median experience at present job was 5 yr for surface mine and plant or mill workers compared with 3 yr for underground mine workers and 4 yr for surface at underground mine workers (table E-32). Surface mine workers had lower median present company experience and total mining experience than the workers at the other three nonoffice work locations.

The following findings are based on data that exclude the job title category of office worker.

- The single largest category of equipment operated was handtools (powered and nonpowered) (table E-3).
- The median experience at present job, present company, and total mining were 4, 8, and 11 yr, respectively (table E-5).
- Mean job-related training during the last 2 yr was about 21 h for anthracite workers and about 35 h for bituminous workers (table E-6).
- Mean age of anthracite workers was 42 yr compared with 39 yr for bituminous workers (table E-7). Also, the percentage of workers 50 yr and over in the anthracite coal industry was much greater than in bituminous coal.
- Males made up 98 pct of the coal workforce (table E-8). Note that the 98-pct figure excludes the unspecified category.
- Whites, blacks, and Hispanics made up 94, 2, and 1 pct, respectively, of the workforce (table E-8). The remaining 3 pct workers belonged either to another race or were unspecified.
- Of those workers whose education was specified, 78 pct had a high school or better education (table E-8). Note that this figure is obtained by (1) summing the workers in the categories high school diploma, vocational diploma, some college, and college degree, and (2) dividing this sum by the total number of workers minus the workers in unspecified category. In this case, it is 96,650 divided by 124,501.
- Median experience with present company for establishments with less than 50 employees was 5 yr compared with about 9 yr for those with 50 or more employees (table E-12).
- Mean job-related training during the last 2 yr was about 30 h for establishments with less than 250 employees, compared with about 42 h for establishments with 250 or more employees (table E-13).
- Mean age was about 39 yr across all size classes (table E-14).
- Those workers that operated no equipment received the most training, an average of 49 h during the last 2 yr (table E-27). At first this result seemed quite surprising, then a close examination of the data by cross referencing to column "None" of table E-16 revealed that most of these workers are in managerial positions. In effect, it is the managers who are receiving the most training (table E-21).
- Education and median experience at the present company were inversely related (table E-45); that is, on the average, the less educated the person was, the longer he or she was employed with the company.
- There were a higher percentage of employees with at least a high school education under the age of 35 yr than there were of age 35 yr and over (table E-46 and figure 1); proportionately more females had high school or higher education than males (table E-47 and figure 2); education by race (table E-48) is shown in figure 3.

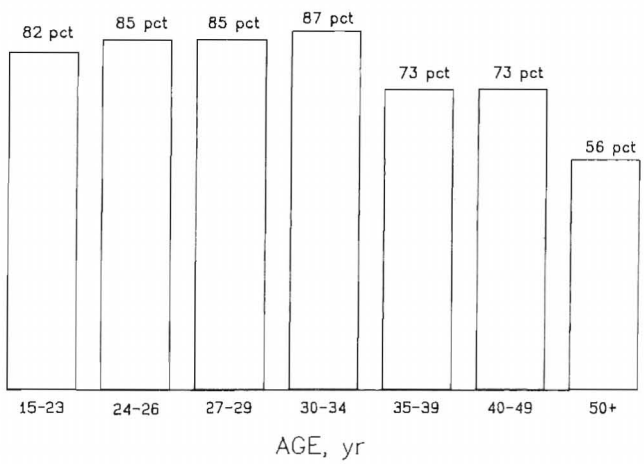


FIGURE 1.—Percentage of coal mining 1986 workforce with at least a high school diploma, by age (excluding job title category of office worker, as well as workers whose education was unspecified).

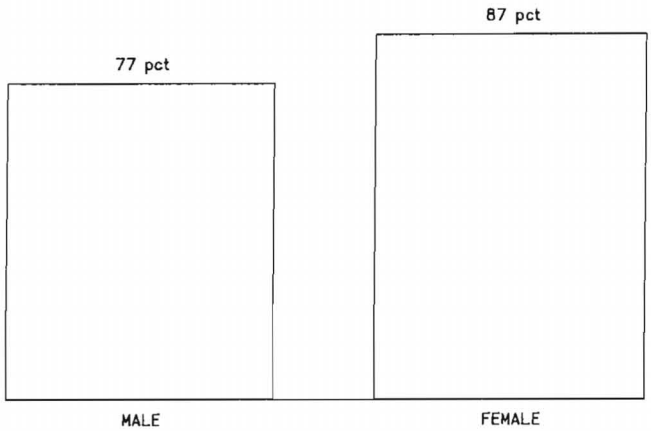


FIGURE 2.—Percentage of coal mining 1986 workforce with at least a high school diploma, by sex (excluding job title category of office worker, as well as workers whose education was unspecified).

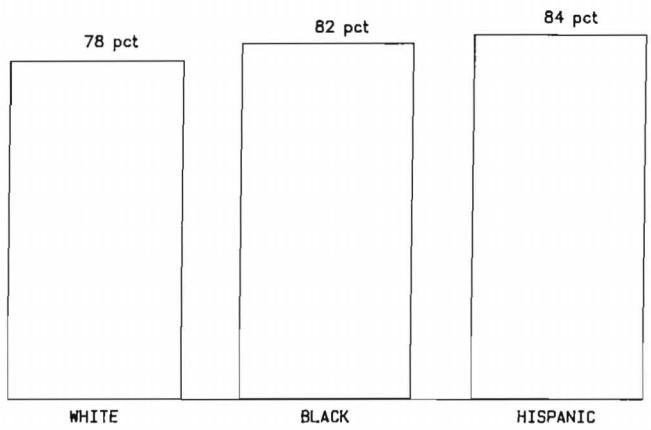


FIGURE 3.—Percentage of coal mining 1986 workforce with at least a high school diploma, by race (excluding job title category of office worker, as well as workers whose education was unspecified).

APPLICATION OF DATA FOR INJURY ANALYSES

The ultimate objective of this study is to provide a basis for—

1. Analyzing the 1986 MSHA coal injury statistics and identifying those subpopulations exhibiting higher or lower than average injury rates.

2. Producing some selected estimates by geographic location such as regions (east, central, west), MSHA districts, or States and performing injury analyses.

3. Developing an easy to use computerized data base that would be available to the researchers to do their own analyses, especially in the area of targeting injury prevention and training efforts.

The results from these analyses, which encompass all facets of mining operations, can help identify areas where research efforts should be devoted to achieve the greatest safety improvements, thus preventing creation of unnecessary regulations or crash research programs that tend to waste funds.

RECOMMENDATIONS FOR FUTURE WORK

1. After the injury analyses are performed, and the hazardous areas or subpopulations have been identified, it would be desirable to further investigate their problems and needs. This can be accomplished by conducting some special surveys such as an equipment use survey, maintenance-related work survey, small mines survey, etc.

2. Repeat the MIPS and perform the injury analyses periodically, say every 3 to 5 yr, in order to study the changing mining environment and its impact on mining safety and productivity. When the survey is repeated, it is recommended that modifications be made to the questionnaire to reflect new needs. It is also recommended that the collection of total mine experience and job-related training data be eliminated, since these variables are conceptually very hard to measure. Also, the variables experience on the job and experience with the company should be measured in years only.

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APPENDIX A.—COAL MINING INDUSTRY JOB TITLE GROUPING

Description	*Job title code*
Backhoe-crane-dragline-shovel operator	367, 378, 340
Beltman-belt cleaner-belt repairman	601, 154, 1012, 996
Blaster	807
Continuous miner and related machine operator	35, 36, 37, 38, 43, 116
Deckhand-barge and dredge operator	372
Dozer-heavy and mobile equipment operator	368, 985
Driller-auger operator	833, 834, 370, 371
Electrician-wireman-lampman	402, 602, 603, 611, 385
Front-end loader operator	382
Grader-scraper operator	375, 957
Laborer-miner-utility man	616, 53, 316, 10, 16, 32, 39, 45, 157, 216, 224, 386, 395, 397, 609, 624, 706, 708, 710, 874, 997, 1013
Longwall operator	40, 41, 44
Manager-foreman-supervisor:	
general	430, 449, 481, 489, 494
maintenance	418
working	749
Mechanic-welder-oiler-machinist	404, 604, 605, 1019, 1018, 1060, 394, 608
Mine technical support	393, 396, 414, 423, 456, 462, 464, 495, 592, 593, 594, 921, 965, 998, 1014, 1017, 1023
Office worker	497
Plant operator-warehouseman	374, 379, 380, 388, 392, 1022
Roof bolter-rock driller	46, 47, 1056
Scoop tractor operator-motorman	128, 269, 969, 262, 276, 373, 962
Shuttle car operator	850
Truck driver	376

Code	*Description*
10	Jacksetter, on face underground
16	Faceman, on section underground
32	Brattice man
35	Continuous miner helper
36	Continuous miner operator
37	Cutting machine helper
38	Cutting machine operator
39	Hand loader operator
40	Headgate operator
41	Longwall helper
	Longwall operator
43	Loading machine operator
	Gathering arm loader operator
44	Shear operator
	Longwall operator
45	Rockman
46	Pinner
	Roof trimmer
	Scaler operator
	Truss bolter
	Roof bolter
47	Roof bolter helper
	Pinner helper
53	Utility man, underground
116	Mucking machine operator, underground
128	Scoop operator, underground
154	Belt cleaner

Code	*Description*
157	Pumper off section, underground
216	Track workers
	Trackman, underground
224	Transportation trainee, underground
262	Brakeman
269	Locomotive operator
	Motorman, underground
276	Jeep driver
	Tractor operator, underground
316	Service truck operator
	Pumper, surface
	Utility man, surface
	Track gang, surface
340	Boom operator
367	Pitman
	Backhoe operator
	Shovel operator
368	Tractor operator, surface
	Dozer operator
370	Auger operator
371	Auger helper
372	Boat operator
	Deckhand
	Barge loader
	Barge attendant
	Dredge operator
373	Car dropper

Code	Description
374	Sandbox operator
	Crusher operator
	Reagent operator
	Preparation plant operator
	Cleaning plant operator
	Shipping
	Bagger-baler
	Blunger operator
	Warehouseman
	Bulk loader
	Storekeeper
	Mill operator
	Car loader
375	Grader operator, surface
376	Truck driver, surface
378	Crane operator, surface
	Dragline operator
379	Kiln operator
	Calciner
	Dryer operator
380	Fine coal plant operator
382	Front-end loader operator, surface
	Loader operator
	Highlift operator
	Payloader operator
385	Lampman
386	Refuse truck driver
388	Shaker operator
	Separator operator
	Screen operator
392	Washery operator
	Binman
	Tipple operator
393	Scaleperson
	Weighmaster
394	Carpenter
395	Water truck operator
396	Watchman
	Security guard
397	Fireman
402	Master electrician
404	Master mechanic
414	Laboratory assistant
	Technicians
	Quality control
	Laboratory technician
	Laboratory supervisor
418	Maintenance supervisor
	Maintenance foreman
423	Surveyor
	Draftsman
430	Assistant foreman-vice president
	Assistant manager
449	President
	Owner
	Mine manager
	Mine foreman
456	Engineer
	Chemist
	Geologist
	Metallurgist

Code	Description
462	Mine examiner
	Examiner
	Preshift examiner
	Fireboss
464	Inspector
481	Assistant supervisor-superintendent
	Superintendents
	Supervisors
489	Outside foreman
494	Mill foreman
	Plant foreman
	Plant manager
	Mill manager
495	Safety director
	Safety manager
	Environmental coordinator
	Safety coordinator
	Safety engineer
497	Clerk
	Office help
	Accountant
	Computer operator
	Secretary
	Timekeeper
	Controller
592	Safety instructor
593	Nurse
594	Training specialist
601	Belt mover
	Conveyor man
	Beltman
	Belt installer
	Tailpiece man
602	Lineman
	Electrician
603	Electrician helper
604	Millwright
	Plumber
	Boilermaker
	Mechanic
	Fueler
	Pipe man
	Repairman
	Pipefitter
	Boiler operator
	Boiler trainee
605	Mechanic helper
608	Mason
609	Material man
	Supplyman
611	Wireman
616	Roustabout
	Miner
	Groundman
	Laborer
	Parts Runner
624	Trainees
	Apprentice
706	Rock duster
708	Ventilation man

Code	*Description*
710	Timberman
	Propman
749	Leadman
	Production supervisor-superintendent
	Section boss
	Section foreman
	Labor foreman
	Shift boss
	Working foreman
	Production foreman
807	Blaster
	Shot firer
	Powder man
	Chargeman
	Hole loader
833	Driller helper
834	Stoper operator
	Driller
850	Buggy operator
	Ramcar operator
	Shuttle car operator
874	Stationery mine equipment operator
	Mine equipment operator
921	Hoist engineer
	Hoist operator
	Hoistman
957	Scraper operator
	Pan operator
962	Trip rider
	Flagman
	Car runner surface
965	Dispatcher
	Expeditor
969	Locomotive engineer
	Motorman
985	Heavy equipment operator
	Mobile equipment operator
996	Feeder operator
997	General or many equipment operator
998	Janitor
1012	Belt repairman
	Belt vulcanizer
1013	Cleanup man
1014	Coal sampler
	Coal tester
	Sampler
1017	Rodman
1018	Greaser
	Oiler
	Lube man
1019	Welder
1022	Dump operator
	Dump man
1023	Transit man
1056	Rock driller
1060	Shopman
	Shop foreman
	Bit sharpener
	Machinist

APPENDIX B.—COAL MINING INDUSTRY EQUIPMENT OPERATED GROUPING

Description	*Equipment code*
Backhoe-crane-dragline-shovel	60, 14
Belt	13, 96
Continuous miner and related machinery	12, 16, 25, 43
Dozer-heavy and mobile equipment	8, 85
Explosives	47
Front-end loader-forklift	24, 23
Grader-scraper	52, 57
Handtools (powered and nonpowered)	28
Hoist	30
Locomotive-mine car	34, 41, 42, 56, 64, 65
Longwalls and parts	35, 36
Many equipment	97
Miscellaneous utility equipment	95
Plant equipment	40, 7, 11, 15, 18, 22, 26, 51, 58, 69, 83
Rock dusting machine-pump	48, 55
Roof bolting machine-underground drill	54, 20, 53
Scale-lab equipment-controls	92, 80, 91
Scoop	33
Shuttle car	61
Surface drill-auger	9, 4
Truck (haulage)	44, 45
Truck (utility)-personnel carrier	67, 37, 66
Welding machine-lathe	70, 5
None	0
Unspecified-not elsewhere classified	99, 98, 3, 71

Code	*Description*
0	None
3	Helicopters
4	Auger
	Auger machine
5	Lathe
7	Boats
	Barges
	Water transportation
8	Bulldozer
	Dozer
	Crawler tractor
9	Carriage-mounted drill
	Jumbo drill
	Churn drill
	Rotary drill
	Jet piercing drill
	Airtrack compressor drill
11	Classifier
	Cyclones
12	Continuous miner
	Dosco miner
13	Conveyor
	All types belts
	Belt feeder
	Mobile bridge carrier
14	Crane
	Derrick
	Cherry picker
	Basket scaler
	Scaling machine
	Rock or dropball
	Boom hoist
	Gantry

Code	*Description*
15	Crusher
	Breaker
16	Undercutter
	Cutting machines
	Chain cutter
18	Dredge
20	Electric drills
	Hydraulic drills
	Coal drills
22	Precipitator heavy media bath
	Filters
	Flotation machines
	Filters
23	Forklift
24	Loader
	Front-end loader
	Highlift
	Payloader
	Bobcat
25	Gathering arm loader
	Coal loading machine
	15BU joy
26	Grizzlies
28	Handtools (powered and nonpowered)
	Ram jack
30	Car dropper
	Hydraulic jack
	Hoist
33	S&S battery
	Unitrac
	Load-haul-dump
	Scoop tram
	Teletram car

Code	Description
34	Trammer
	Lorry car
	Locomotive
	Rail-mounted locomotive
	Tow-motor
35	Longwall machine
	Plow shearer
36	Longwall shield
	Jacks or chocks
	Longwall subparts
37	Golf cart
	Mancar
	Inspector's friend
	Jeep
	Mantrip
	Personnel carrier
	Porta bus
	Boss buggy
	Rail runner
	Rail rover
39	Grinding mills
	Rod or ball mills
40	Milling machinery
	General plant equipment
	Sandboxes
	Block press
41	Underground flatcar
	Timber truck, underground
	Nipper truck, underground
	Mine car, underground
42	Boxcar, surface
	Hopper car, surface
	Mine car, surface
	Ore-coal car, surface
43	Overshot loader
	Mucking machine
44	Ore haulage trucks, offhighway
45	Payloader ore haulage, onhighway
47	Driller loader
	Powder buggy
	Pneumatic blast agent loader
	Explosives
	Prill loader
	Pop shooter
48	Pump
51	Dump bins
	Raw coal storage
	Tipple
52	Motor grader
	Motor patrol
	Road grader
53	Track drill
	Jackleg
	Airleg
	Drifter drill
	Stoper drill
	Diamond drill
	Jackhammer
	Hydraulic drill
	Rock drill
	Buzzy drill
	Jumbo drill
54	Pinner
	Scaler
	Roof bolting machine
	Rock bolting machine
	Trussbolter
55	Rock dusting machine
56	Rump rail
	Rotary dump
57	Scoop, surface
	Self-loading scraper
	Scraper loader
	Pan scraper
	Tractor scraper
58	Vibrator
	Shaker
	Screen
60	Dragline
	Power shovel
	Dragline bucket
	Big muskie
	Stripping shovel
	Gradall
	Backhoe
	Clamshell
61	Buggy
	Shuttle car
	Ram car
64	Tamping machine
	Railroad tie packer
65	Track maintenance
	Track repair equipment
66	Elkhorn
	Tractor, underground
	Supply car
67	Service truck
	Pickup truck
	Water truck
	Dump truck
	Trash truck
	Utility truck
69	Washers
70	Welding machine
	Torch
71	Drilling rigs
	Machines, not elsewhere classified
	Wheelbarrows
	Rock rake
	Hydroseeder
	Impact roller
80	Lab equipment
83	Calciners
	Kilns
	Furnaces
	Dryers
85	Heavy equipment
	Mobile equipment
91	Controls
	Consoles
92	Scales
95	Miscellaneous utility equipment
96	Feeder
97	General or many equipment
98	Not elsewhere classified
99	Not specified

APPENDIX C.—ESTIMATION PROCEDURES

Establishment weight.—Suppose one out of every five mine establishments in a sampling stratum (industry-mine type-employment size class-status) was selected. Then, the sampling ratio is 1/5, and the establishment weight (EWT) is 5.00, the inverse of the sampling ratio.

Nonresponse adjustment factor.—Also suppose in a given sampling stratum, 80 pct of the establishments that were within the scope of the survey responded. Then, the nonresponse adjustment factor (NRAF) is 1.25 (i.e., 100/80).

Worker weight.—Additionally, there was the sampling ratio with which the workers in the establishment were sampled; the worker weight (WWT) ranged from 1.00 to 30.00 (see the first page of MIPS questionnaire in appendix F). Theoretically, all the workers in a sampling stratum should have had the same weight. Hence, there would have been no need to assign weight at the worker level as the worker weight could have been incorporated into the establishment weight. In practice, however, this is seldom the case because for a few establishments the employment level changes from what it was on the sampling frame to the time of the survey data collection. Since all the establishments did not report in the same employment size class that they were sampled in, it was necessary to also assign each worker a weight.

Final weight.—For the purpose of computing the estimates, each worker was assigned a final weight (FWT), which was the product of establishment weight (EWT), nonresponse adjustment factor (NRAF), and the worker weight (WWT). That is, FWT = EWT × NRAF × WWT.

Estimates of number of workers.—The estimates of the total number of workers were computed by (1) summing the final weights over the appropriate domain, and (2) rounding the sum to the nearest integer.

Example: To estimate the total number of truck drivers in the anthracite coal industry:

1. Compute $x = \sum_{i \epsilon D} FWT_i$,

where, the domain D was the set of all records (workers) that had an industry code of anthracite and occupation code of truck driver.

2. Compute y = round (x).

Estimates of mean.—The estimates of mean age (training) were computed by summing over the appropriate domain (1) the product of age (training) and final weight, (2) the final weights, and then, (3) dividing the sum of the products by the sum of the weights and rounding the result to the nearest whole number. It should be noted that for each domain only these entries where age (training) was specified were included in the computation:

Example: The mean age of the blasters in the coal industry was estimated as follows.

1. Compute $x = \sum_{i \epsilon D} (Age_i * FWT_i)$.

2. Compute $y = \sum_{i \epsilon D} FWT_i$,

where, domain D is the set of all records on the coal file (anthracite as well as bituminous industry) that had an occupation code of blasters with age being specified.

3. Compute z = round (x/y).

Estimates of median.—The estimates of median job, company, and mining experience were derived by (1) sorting the records within the domain in ascending order of the experience for which the median statistic was desired, (2) computing the total number of workers (NW) in the domain by summing the final weights, and (3) selecting the experience corresponding to the middle worker(s) in the ordering. That is, if NW is an odd number, then the median experience is the experience corresponding to the (NW/2 + 1)th worker in the ordering; if NW is an even number, then the median experience is the midpoint (rounded to the nearest integer) of the experience corresponding to the (NW/2)th and (NW/2 + 1)th worker in the ordering. As with the mean estimates, the median estimates also excluded those entries in the domain with unspecified experience.

APPENDIX D.—RELIABILITY OF ESTIMATES: RANDOM GROUP VARIANCE TECHNIQUE

The random group method of variance estimation employed in this study consisted of selecting eight samples using the same sampling scheme for each sample as the parent sample. The primary sampling units (establishments) were divided into two sets. The first set consisted of noncertainty (probability of selection less than 1.00) primary sampling units sorted by their original industry-mine type-employment size class-status. A random integer, say j, between 1 and 8 was generated. The first primary unit in the ordering was assigned to the random group j, the second to the random group j + 1, and so forth in a modulo 8 fashion. Then, the secondary sampling units (workers) were assigned the same random group number as the primary unit to which they belonged.

The second set consisted of all secondary sampling units belonging to the certainty (probability of selection equal to 1.00) primary sampling units. The secondary sampling units were sorted by the same scheme as above, and a random integer, say k, between 1 and 8 was generated. Then, the first secondary unit in the ordering was assigned to the random group k, the second to the random group k + 1, and so forth in a modulo 8 fashion. Hence, each worker belonged to a random group. For a more detailed discussion of the random group technique, the reader is referred to reference 4 of the main text.

The following procedure was followed in computing the estimated variance (var), standard error (s), and the coefficient of variation (CV) for the estimated number of workers belonging to a particular category.

1. The domain (i.e., category) was defined.
2. A separate estimate for total number of workers, $\hat{\theta}_i$, for each of the eight random groups was computed. If any random group was empty, then a zero was assigned to that random group.
3. Total number of workers, $\hat{\theta}$, for all eight groups was computed as

$$\hat{\theta} = \hat{\theta}_1 + \hat{\theta}_2 + \ldots + \hat{\theta}_8.$$

4. The mean number of workers per group was computed as

$$\bar{\hat{\theta}} = \hat{\theta}/8.$$

5. The variance for $\hat{\theta}$ was computed as

$$\text{var}(\hat{\theta}) = 8 \sum_{i=1}^{8} \frac{(\hat{\theta}_i - \bar{\hat{\theta}})^2}{7}.$$

6. The standard error of $\hat{\theta}$ was computed as

$$s(\hat{\theta}) = \sqrt{\text{var}(\hat{\theta})}.$$

7. The CV for $\hat{\theta}$ was computed as

$$\text{CV}(\hat{\theta}) = \frac{s(\hat{\theta})}{\hat{\theta}} \times 100.0.$$

APPENDIX E.—COAL MINING 1986 WORKFORCE ESTIMATES

TABLE E–1.—Coal mining 1986 workforce estimates: employment size class, by type of coal mined

Employment size class[1]	Anthracite		Bituminous		Total	
	Workers	pct	Workers	pct	Workers	pct
1–19	1,016	39	16,999	11	18,016	12
20–49	882	34	21,495	14	22,377	15
50–99	300	12	14,473	10	14,773	10
100–249	380	15	34,248	23	34,628	23
250–499	0	0	41,935	28	41,935	28
500+	0	0	20,009	13	20,009	13
Total	2,578	100	149,158	100	151,737	100

[1]MSHA size groups are based on the annual average employment of the primary subunit and not on the total employment; hence, MSHA published injury statistics by size groups should not be analyzed against these data.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E–2.—Coal mining 1986 workforce estimates: job title, by type of coal mined

Job title grouping [1]	Anthracite		Bituminous		Total	
	Workers	pct	Workers	pct	Workers	pct
Backhoe-crane-dragline-shovel operator	188	7	2,825	2	3,013	2
Beltman-belt cleaner-belt repairman	7	0	5,214	3	5,221	3
Blaster	9	0	1,209	1	1,218	1
Continuous miner and related machine operator	4	0	6,433	4	6,437	4
Deckhand-barge and dredge operator	3	0	232	0	235	0
Dozer-heavy and mobile equipment operator	101	4	10,480	7	10,580	7
Driller-auger operator	110	4	2,762	2	2,872	2
Electrician-wireman-lampman	50	2	6,155	4	6,205	4
Front-end loader operator	132	5	4,192	3	4,324	3
Grader-scraper operator	12	0	2,446	2	2,459	2
Laborer-miner-utility man	620	24	22,647	15	23,267	15
Longwall operator	0	0	1,036	1	1,036	1
Manager-foreman-supervisor:						
General	187	7	9,214	6	9,400	6
Maintenance	2	0	2,250	2	2,252	1
Working	6	0	5,515	4	5,521	4
Mechanic-welder-oiler-machinist	503	19	22,735	15	23,237	15
Mine technical support	90	4	6,707	4	6,797	4
Office worker	81	3	5,261	3	5,342	3
Plant operator-warehouseman	160	6	5,735	4	5,895	4
Roof bolter-rock driller	0	0	8,206	6	8,206	5
Scoop tractor operator-motorman	15	1	5,261	4	5,277	3
Shuttle car operator	0	0	5,646	4	5,646	4
Truck driver	301	12	3,997	5	7,297	5
Total	2,578	100	149,158	100	151,737	100

[1]As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E-3.—Coal mining 1986 workforce estimates:[1] principal equipment operated, by type of coal mined

Equipment operated grouping[2]	Anthracite		Bituminous		Total	
	Workers	pct	Workers	pct	Workers	pct
Backhoe-crane-dragline-shovel	181	7	2,887	2	3,067	2
Belt	10	0	5,299	4	5,308	4
Continuous miner and related machinery	4	0	6,222	4	6,226	4
Dozer-heavy and mobile equipment	103	4	9,638	7	9,741	7
Explosives	9	0	1,209	1	1,218	1
Front-end loader-forklift	167	7	5,216	4	5,383	4
Grader-scraper	12	0	2,868	2	2,881	2
Handtools (powered and nonpowered)	390	16	25,633	18	26,023	18
Hoist	41	2	443	0	484	0
Locomotive-mine car	19	1	3,997	3	4,016	3
Longwalls and parts	0	0	945	1	945	1
Many equipment	29	1	2,859	2	2,888	2
Miscellaneous utility equipment	490	20	12,810	9	13,300	9
Plant equipment	136	5	4,108	3	4,245	3
Rock dusting machine-pump	2	0	1,132	1	1,134	1
Roof bolting machine-underground drill	23	1	8,844	6	8,868	6
Scale-lab equipment-controls	26	1	2,182	2	2,208	2
Scoop	0	0	3,853	3	3,853	3
Shuttle car	0	0	5,703	4	5,703	4
Surface drill-auger	92	4	2,055	1	2,147	1
Truck (haulage)	310	12	7,311	5	7,621	5
Truck (utility)-personnel carrier	6	0	2,487	2	2,494	2
Welding machine-lathe	225	9	4,284	3	4,509	3
None	207	8	21,735	15	21,942	15
Unspecified-not elsewhere classified	14	1	178	0	192	0
Total	2,498	100	143,897	100	146,395	100

[1]Excluding job title category of office workers.
[2]See appendix B for detailed explanation of equipment operated grouping.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E-4.—Coal mining 1986 workforce estimates: work location at mine, by type of coal mined

Work location	Anthracite		Bituminous		Total	
	Workers	pct	Workers	pct	Workers	pct
Underground mine	392	15	69,471	47	69,863	46
Surface at underground mine	121	5	8,757	6	8,878	6
Surface mine	1,229	48	51,061	34	52,291	34
Plant or mill	730	28	12,222	8	12,952	9
Office	107	4	7,647	5	7,753	5
Total	2,578	100	149,158	100	151,737	100

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E–5.—Coal mining 1986 workforce estimates:[1] experience at job, company, and mining, by type of coal mined

Experience, yr	Anthracite		Bituminous		Total	
	Workers	pct	Workers	pct	Workers	pct
At present job:						
0< to ≤1	219	9	26,011	18	26,230	18
1< to ≤2	243	10	20,877	15	21,120	14
2< to ≤3	117	5	13,707	10	13,824	9
3< to ≤5	218	9	21,911	15	22,129	15
5< to ≤10	439	18	34,212	24	34,651	24
10< to ≤20	345	14	14,047	10	14,392	10
20<	136	5	1,587	1	1,723	1
Unspecified	781	31	11,545	8	12,325	8
Total	2,498	100	143,897	100	146,395	100
Median yr	6	NAp	4	NAp	4	NAp
At present company:						
0< to ≤1	311	12	10,647	7	10,958	7
1< to ≤5	725	29	35,467	25	36,193	25
5< to ≤10	488	20	43,556	30	44,044	30
10< to ≤15	630	25	33,153	23	33,783	23
15< to ≤20	177	7	12,129	8	12,307	8
20< to ≤25	93	4	2,525	2	2,618	2
25< to ≤30	28	1	1,074	1	1,102	1
30<	35	1	2,760	2	2,795	2
Unspecified	9	0	2,586	2	2,595	2
Total	2,498	100	143,897	100	146,395	100
Median yr	7	NAp	8	NAp	8	NAp
Total mining:						
0< to ≤1	89	4	3,341	2	3,430	2
1< to ≤5	299	12	16,591	12	16,890	12
5< to ≤10	291	12	38,623	27	38,914	27
10< to ≤15	287	11	33,668	23	33,955	23
15< to ≤20	114	5	14,152	10	14,266	10
20< to ≤25	85	3	4,524	3	4,610	3
25< to ≤30	88	4	2,168	2	2,257	2
30<	66	3	4,335	3	4,401	3
Unspecified	1,179	47	26,494	18	27,673	19
Total	2,498	100	143,897	100	146,395	100
Median yr	10	NAp	11	NAp	11	NAp

NAp Not applicable.
[1]Excluding job title category of office workers.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E–6.—Coal mining 1986 workforce estimates:[1] training received, by type of coal mined

Job training for last 2 yr, h	Anthracite			Bituminous			Total		
	Mean	Workers	pct	Mean	Workers	pct	Mean	Workers	pct
0	0	167	7	0	4,157	3	0	4,324	3
1–8	8	104	4	7	6,328	4	7	6,432	4
9–15	12	12	0	11	2,080	1	11	2,092	1
16	16	963	39	16	46,775	33	16	47,738	33
17–40	35	117	5	29	31,186	22	29	31,303	21
41–80	71	114	5	58	14,102	10	58	14,216	10
81–160	125	17	1	111	5,645	4	111	5,662	4
161 +	240	6	0	306	2,667	2	306	2,673	2
Unspecified	NAp	997	40	NAp	30,956	22	NAp	31,953	22
Total or mean	21	2,498	100	35	143,897	100	35	146,395	100

NAp Not applicable.
[1]Excluding job title category of office workers.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E–7.—Coal mining 1986 workforce estimates:[1] age distribution, by type of coal mined

Age, yr	Anthracite			Bituminous			Total		
	Mean	Workers	pct	Mean	Workers	pct	Mean	Workers	pct
15–20	19	30	1	19	735	1	19	765	1
21–23	22	94	4	22	2,946	2	22	3,040	2
24–26	25	130	5	25	7,750	5	25	7,879	5
27–29	28	184	7	28	14,541	10	28	14,725	10
30–34	32	378	15	32	31,287	22	32	31,665	22
35–39	37	332	13	37	28,222	20	37	28,554	20
40–49	44	471	19	44	33,971	24	44	34,441	24
50+	58	777	31	56	22,682	16	56	23,459	16
Unspecified	NAp	103	4	NAp	1,763	1	NAp	1,866	1
Total or mean	42	2,498	100	39	143,897	100	39	146,395	100

[1]Excluding job title category of office workers.
NAp Not applicable.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E–8.—Coal mining 1986 workforce estimates:[1] sex, race, and education, by type of coal mined

	Anthracite		Bituminous		Total	
	Workers	pct	Workers	pct	Workers	pct
Sex:						
Male	2,487	100	139,876	97	142,363	97
Female	10	0	3,317	2	3,328	2
Unspecified	0	0	704	0	704	0
Total	2,498	100	143,897	100	146,395	100
Race:						
White	2,480	99	134,640	94	137,120	94
Black	6	0	3,606	3	3,612	2
Hispanic	5	0	912	1	917	1
Other	5	0	2,927	2	2,932	2
Unspecified	1	0	1,812	1	1,814	1
Total	2,498	100	143,897	100	146,395	100
Education level:						
Some elementary	61	2	8,409	6	8,470	6
Some high school	173	7	19,207	13	19,380	13
High school diploma	1,148	46	66,266	46	67,413	46
Vocational diploma	151	6	10,221	7	10,372	7
Some college	35	1	12,411	9	12,446	9
College degree	52	2	6,367	4	6,419	4
Unspecified	877	35	21,017	15	21,894	15
Total	2,498	100	143,897	100	146,395	100

[1]Excluding job title category of office workers.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E–9.—Coal mining 1986 workforce estimates: job title, by employment size class[1]

Job title grouping[2]	1–19		20–49		50–99		100–249		250–499		500+		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Backhoe-crane-dragline-shovel operator	525	3	487	2	361	2	766	2	673	2	200	1	3,013	2
Beltman-belt cleaner-belt repairman	355	2	343	3	331	2	1,281	4	1,682	4	928	5	5,221	3
Blaster	217	1	241	1	184	1	207	1	295	1	75	0	1,218	1
Continuous miner and related machine operator	711	4	853	4	379	3	1,668	5	2,156	5	669	3	6,437	4
Deckhand-barge and dredge operator	136	1	26	0	15	0	42	0	15	0	0	0	235	0
Dozer-heavy and mobile equipment operator	1,902	11	2,265	10	1,266	9	1,888	5	1,859	4	1,400	7	10,580	7
Driller-auger operator	640	4	557	2	362	2	486	1	539	1	287	1	2,872	2
Electrician-wireman-lampman	381	2	773	3	806	5	1,428	4	2,057	5	760	4	6,205	4
Front-end loader operator	1,616	9	1,264	6	555	4	699	2	166	0	25	0	4,324	3
Grader-scraper operator	268	1	366	2	243	2	653	2	688	2	240	1	2,459	2
Laborer-miner-utility man	1,750	10	2,326	10	1,636	11	5,945	17	8,431	20	3,178	16	23,267	15
Longwall operator	0	0	0	0	0	0	231	1	486	1	319	2	1,036	1
Manager-foreman-supervisor:														
General	2,109	12	2,077	9	909	6	1,629	5	1,948	5	729	4	9,400	6
Maintenance	80	0	135	1	210	1	510	1	809	2	507	3	2,252	1
Working	232	1	523	2	358	2	1,370	4	2,161	5	878	4	5,521	4
Mechanic-welder-oiler-machinist	1,442	8	2,765	12	2,488	17	5,250	15	6,752	16	4,540	23	23,237	15
Mine technical support	727	4	871	4	674	5	1,715	5	1,832	4	979	5	6,797	4
Office worker	902	5	809	4	581	4	1,251	4	1,210	3	589	3	5,342	4
Plant operator-warehouseman	653	4	1,092	5	855	6	1,344	4	1,248	3	702	4	5,895	4
Roof bolter-rock driller	903	5	1,311	6	565	4	2,036	6	2,312	6	1,079	5	8,206	5
Scoop tractor operator-motorman	861	5	788	4	392	3	1,130	3	1,418	3	689	3	5,277	3
Shuttle car operator	307	2	687	3	483	3	1,762	5	1,865	4	541	3	5,646	4
Truck driver	1,299	7	1,518	7	1,118	8	1,335	4	1,333	3	695	3	7,297	5
Total	18,016	100	22,377	100	14,773	100	34,628	100	41,935	100	20,009	100	151,737	100

[1]MSHA size groups are based on the annual average employment of the primary subunit and not on the total employment; hence, MSHA published injury statistics by size groups should not be analyzed against these data.

[2]As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E–10.—Coal mining 1986 workforce estimates:[1] principal equipment operated, by employment size class[2]

Equipment operated grouping[3]	1–19		20–49		50–99		100–249		250–499		500+		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Backhoe-crane-dragline-shovel	593	3	494	2	358	3	682	2	691	2	250	1	3,067	2
Belt	432	3	646	3	331	2	1,288	4	1,682	4	928	5	5,308	4
Continuous miner and related machinery	699	4	814	4	347	2	1,650	5	2,140	5	575	3	6,226	4
Dozer-heavy and mobile equipment	1,850	11	2,191	10	1,104	8	1,767	5	1,528	4	1,301	7	9,741	7
Explosives	217	1	241	1	184	1	207	1	295	1	75	0	1,218	1
Front-end loader-forklift	1,925	11	1,343	6	639	5	810	2	492	1	174	1	5,383	4
Grader-scraper	316	2	383	2	281	2	746	2	915	2	240	1	2,881	2
Handtools (powered and nonpowered)	1,820	11	3,173	15	2,734	19	5,864	18	7,943	20	4,489	23	26,023	18
Hoist	55	0	9	0	7	0	146	0	193	0	74	0	484	0
Locomotive-mine car	110	1	259	1	348	2	930	3	1,757	4	612	3	4,016	3
Longwalls and parts	0	0	0	0	0	0	286	1	417	1	242	1	945	1
Many equipment	151	1	208	1	174	1	780	2	1,206	3	370	2	2,888	2
Miscellaneous utility equipment	1,057	6	1,522	7	888	6	3,366	10	4,446	11	2,021	10	13,300	9
Plant equipment	768	4	953	4	649	5	772	2	710	2	393	2	4,245	3
Rock dusting machine-pump	11	0	19	0	72	1	309	1	500	1	223	1	1,134	1
Roof bolting machine-underground drill	1,165	7	1,442	7	618	4	2,100	6	2,483	6	1,059	5	8,868	6
Scale-lab equipment-controls	295	2	459	2	292	2	631	2	456	1	75	0	2,208	2
Scoop	777	5	531	2	228	2	725	2	1,051	3	541	3	3,853	3
Shuttle car	307	2	687	3	487	3	1,799	5	1,882	5	541	3	5,703	4
Surface drill-auger	413	2	418	2	352	2	436	1	353	1	175	1	2,147	1
Truck (haulage)	1,331	8	1,574	7	1,206	8	1,375	4	1,439	4	695	4	7,621	5
Truck (utility)-personnel carrier	127	1	410	2	234	2	599	2	688	2	436	2	2,494	2
Welding machine-lathe	261	2	503	2	585	4	1,071	3	1,142	3	947	5	4,509	3
None	2,427	14	3,279	15	2,041	14	4,969	15	6,279	15	2,947	15	21,942	15
Unspecified-not elsewhere classified	8	0	12	0	30	0	70	0	35	0	37	0	192	0
Total	17,114	100	21,568	100	14,191	100	33,377	100	40,725	100	19,420	100	146,395	100

[1]Excluding job title category office workers.
[2]MSHA size groups are based on the annual average employment of the primary subunit and not on the total employment; hence, MSHA published injury statistics by size groups should not be analyzed against these data.
[3]See appendix B for detailed explanation of equipment operated grouping.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E–11.—Coal mining 1986 workforce estimates: work location at mine, by employment size class[1]

Work location	1–19		20–49		50–99		100–249		250–499		500+		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Underground mine	5,545	31	7,556	34	4,179	28	17,370	50	25,083	60	10,129	51	69,863	46
Surface at underground mine	907	5	1,107	5	359	2	2,145	6	2,871	7	1,489	7	8,878	6
Surface mine	7,478	42	8,755	39	7,192	49	11,091	32	10,954	26	6,820	34	52,291	34
Plant or mill	2,885	16	3,725	17	2,160	15	2,038	6	1,336	3	808	4	12,952	9
Office	1,200	7	1,233	6	883	6	1,983	6	1,691	4	763	4	7,753	5
Total	18,016	100	22,377	100	14,773	100	34,628	100	41,935	100	20,009	100	151,737	100

[1]MSHA size groups are based on the annual average employment of the primary subunit and not on the total employment; hence, MSHA published injury statistics by size groups should not be analyzed against these data.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E-12.—Coal mining 1986 workforce estimates:[1] experience at job, company, and mining, by employment size class[2]

Experience, yr	1–19		20–49		50–99		100–249		250–499		500+		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
At present job:														
0< to ≤1	3,799	22	3,579	17	1,626	11	5,929	18	9,083	22	2,214	11	26,230	18
1< to ≤2	2,137	12	2,457	11	1,609	11	5,414	16	6,371	16	3,132	16	21,120	14
2< to ≤3	1,787	10	2,385	11	914	6	2,720	8	4,252	10	1,766	9	13,824	9
3< to ≤5	2,201	13	3,611	17	2,609	18	4,712	14	6,148	15	2,848	15	22,129	15
5< to ≤10	3,288	19	4,120	19	3,906	28	7,447	22	9,742	24	6,148	32	34,651	24
10< to ≤20	1,813	11	2,087	10	1,481	10	3,499	10	4,178	10	1,334	7	14,392	10
20<	417	2	279	1	222	2	351	1	405	1	50	0	1,723	1
Unspecified	1,672	10	3,050	14	1,824	13	3,305	10	547	1	1,928	10	12,325	8
Total	17,114	100	21,568	100	14,191	100	33,377	100	40,725	100	19,420	100	146,395	100
Median, yr	3	NAp	4	NAp	5	NAp	4	NAp	4	NAp	5	NAp	4	NAp
At present company:														
0< to ≤1	3,173	19	3,120	14	696	5	2,197	7	1,306	3	467	2	10,958	7
1< to ≤5	5,619	33	9,181	43	3,530	25	7,747	23	7,389	18	2,726	14	36,193	25
5< to ≤10	3,630	21	4,286	20	5,283	37	9,836	29	12,685	31	8,323	43	44,044	30
10< to ≤15	2,036	12	2,617	12	2,444	17	8,138	24	12,750	31	5,799	30	33,783	23
15< to ≤20	730	4	931	4	1,063	7	3,391	10	4,932	12	1,261	6	12,307	8
20< to ≤25	174	1	309	1	285	2	772	2	656	2	423	2	2,618	2
25< to ≤30	120	1	134	1	232	2	210	1	209	1	198	1	1,102	1
30<	455	3	344	2	429	3	613	2	768	2	186	1	2,795	2
Unspecified	1,178	7	646	3	230	2	475	1	30	0	37	0	2,595	2
Total	17,114	100	21,568	100	14,191	100	33,377	100	40,725	100	19,420	100	146,395	100
Median, yr	5	NAp	5	NAp	8	NAp	9	NAp	10	NAp	9	NAp	8	NAp
Total mining:														
0< to ≤1	1,000	6	619	3	298	2	1,019	3	415	1	80	0	3,430	2
1< to ≤5	3,091	18	2,740	13	1,503	11	4,441	13	3,719	9	1,396	7	16,890	12
5< to ≤10	4,348	25	3,969	18	3,857	27	8,320	25	11,473	28	6,947	36	38,914	27
10< to ≤15	3,091	18	3,609	17	2,634	19	8,601	26	11,847	29	4,173	21	33,955	23
15< to ≤20	1,368	8	1,697	8	1,192	8	3,680	11	5,152	13	1,177	6	14,266	10
20< to ≤25	732	4	740	3	485	3	942	3	1,237	3	473	2	4,610	3
25< to ≤30	418	2	405	2	253	2	487	1	544	1	149	1	2,257	2
30<	686	4	642	3	636	4	1,077	3	1,162	3	199	1	4,401	3
Unspecified	2,380	14	7,148	33	3,333	23	4,810	14	5,175	13	4,826	25	27,673	19
Total	17,114	100	21,568	100	14,191	100	33,377	100	40,725	100	19,420	100	146,395	100
Median, yr	9	NAp	10	NAp	10	NAp	11	NAp	11	NAp	10	NAp	11	NAp

NAp Not applicable.

[1]Excluding job title category of office workers.

[2]MSHA size groups are based on the annual average employment of the primary subunit and not on the total employment; hence, MSHA published injury statistics by size groups should not be analyzed against these data.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E–13.—Coal mining 1986 workforce estimates:[1] training received, by employment size class[2]

Job training for last 2 yr, h	1–19		20–49		50–99		100–249		250–499		500+		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
0	846	5	386	2	94	1	948	3	89	0	1,961	10	4,324	3
1–8	1,205	7	668	3	531	4	1,601	5	1,464	4	963	5	6,432	4
9–15	418	2	368	2	254	2	115	0	542	1	395	2	2,092	1
16	5,383	31	6,649	31	6,703	47	13,273	40	10,739	26	4,991	26	47,738	33
17–40	3,088	18	4,089	19	2,251	16	6,959	21	12,226	30	2,689	14	31,303	21
41–80	1,219	7	1,994	9	1,294	9	3,213	10	4,946	12	1,550	8	14,216	10
81–160	792	5	325	2	363	3	929	3	2,444	6	809	4	5,662	4
161+	98	1	176	1	134	1	679	2	879	2	707	4	2,673	2
Unspecified	4,065	24	6,913	32	2,566	18	5,660	17	7,394	18	5,355	28	31,953	22
Total	17,114	100	21,568	100	14,191	100	33,377	100	40,725	100	19,420	100	146,395	100
Mean job training, h	30	NAp	30	NAp	29	NAp	31	NAp	40	NAp	48	NAp	35	NAp

NAp Not applicable.
[1]Excluding job title category of office workers.
[2]MSHA size groups are based on the annual average employment of the primary subunit and not on the total employment; hence, MSHA published injury statistics by size groups should not be analyzed against these data.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E–14.—Coal mining 1986 workforce estimates:[1] age distribution, by employment size class[2]

Age, yr	1–19		20–49		50–99		100–249		250–499		500+		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
15–20	315	2	253	1	65	0	82	0	50	0	0	0	765	1
21–23	796	5	780	4	264	2	639	2	506	1	55	0	3,040	2
24–26	1,332	8	1,586	7	954	7	1,763	5	1,454	4	790	4	7,879	5
27–29	1,803	11	2,305	11	1,384	10	3,280	10	4,142	10	1,812	9	14,725	10
30–34	2,960	17	4,555	21	2,792	20	6,973	21	9,557	23	4,828	25	31,665	22
35–39	2,566	15	3,903	18	2,753	19	7,064	21	8,806	22	3,461	18	28,554	20
40–49	3,563	21	4,659	22	3,380	24	7,744	23	10,267	25	4,828	25	34,441	24
50+	2,875	17	3,371	16	2,574	18	5,276	16	5,942	15	3,421	18	23,459	16
Unspecified	905	5	156	1	24	0	555	2	0	0	225	1	1,866	1
Total	17,114	100	21,568	100	14,191	100	33,377	100	40,725	100	19,420	100	146,395	100
Mean age, yr	38	NAp	38	NAp	39	NAp	39	NAp	39	NAp	40	NAp	39	NAp

NAp Not applicable.
[1]Excluding job title category of office workers.
[2]MSHA size groups are based on the annual average employment of the primary subunit and not on the total employment; hence, MSHA published injury statistics by size groups should not be analyzed against these data.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E–15.—Coal mining 1986 workforce estimates:[1] sex, race, and education, by employment size class[2]

	1–19		20–49		50–99		100–249		250–499		500+		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Sex:														
Male	16,906	99	21,114	98	13,989	99	32,515	97	39,479	97	18,361	95	142,363	97
Female	175	1	209	1	162	1	824	2	1,216	3	742	4	3,328	2
Unspecified	32	0	245	1	41	0	39	0	30	0	317	2	704	0
Total	17,114	100	21,568	100	14,191	100	33,377	100	40,725	100	19,420	100	146,395	100
Race:														
White	16,855	98	20,485	95	13,843	98	31,567	95	37,879	93	16,490	85	137,120	94
Black	38	0	115	1	107	1	722	2	1,435	4	1,194	6	3,612	2
Hispanic	34	0	19	0	116	1	419	1	254	1	75	0	917	1
Other	0	0	289	1	83	1	166	0	1,107	3	1,287	7	2,932	2
Unspecified	187	1	660	3	41	0	502	2	49	0	374	2	1,814	1
Total	17,114	100	21,568	100	14,191	100	33,377	100	40,725	100	19,420	100	146,395	100
Education level:														
Some elementary	1,555	9	1,641	8	963	7	1,673	5	1,910	5	727	4	8,470	6
Some high school	3,154	18	3,452	16	1,971	14	3,907	12	5,303	13	1,594	8	19,380	13
High school diploma	7,622	45	9,654	45	6,164	43	15,875	48	20,462	50	7,636	39	67,413	46
Vocational diploma	1,333	8	1,166	5	1,125	8	1,968	6	3,480	9	1,300	7	10,372	7
Some college	930	5	962	4	893	6	2,487	7	4,692	12	2,482	13	12,446	9
College degree	756	4	505	2	636	4	1,467	4	2,213	5	842	4	6,419	4
Unspecified	1,764	10	4,188	19	2,439	17	6,000	18	2,665	7	4,839	25	21,894	15
Total	17,114	100	21,568	100	14,191	100	33,377	100	40,725	100	19,420	100	146,395	100

[1]Excluding job title category of office workers.
[2]MSHA size groups are based on the annual average employment of the primary subunit and not on the total employment; hence, MSHA published injury statistics by size groups should not be analyzed against these data.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E-16.—Coal mining 1986 workforce estimates: job title, by principal equipment operated[1], number of workers

Job title grouping[2]	Backhoe crane dragline shovel	Belt	Continuous miner related machinery	Dozer heavy mobile equipment	Explosives	Front-end loader forklift	Grader Scraper	Hand-tools (powered and nonpowered)	Hoist
Backhoe-crane-dragline-shovel operator	2,842	0	0	0	0	0	0	0	0
Beltman-belt cleaner-belt repairman	0	5,221	0	0	0	0	0	0	0
Blaster	0	0	0	0	1,218	0	0	0	0
Continuous miner and related machine operator	0	0	6,140	0	0	0	0	10	0
Deckhand-barge and dredge operator	0	0	0	0	0	0	0	0	0
Dozer-heavy and mobile equipment operator	107	0	0	9,404	0	365	405	0	0
Driller-auger operator	0	0	0	0	0	0	0	0	0
Electrician-wireman-lampman	0	0	0	0	0	0	0	6,144	0
Front-end loader operator	0	0	0	15	0	4,293	0	0	0
Grader-scraper operator	0	0	0	0	0	0	2,459	0	0
Laborer-miner-utility man	67	53	64	202	0	275	10	1,138	108
Longwall operator	0	0	0	0	0	0	0	0	0
Manager-foreman-supervisor:									
General	48	0	22	108	0	125	0	4	13
Maintenance	0	0	0	0	0	0	0	0	0
Working	4	0	0	4	0	31	8	0	0
Mechanic-welder-oiler-machinist	0	0	0	0	0	0	0	18,725	0
Mine technical support	0	0	0	9	0	12	0	0	341
Office worker	0	0	0	0	0	0	0	0	0
Plant operator-warehouseman	0	35	0	0	0	272	0	3	15
Roof bolter-rock driller	0	0	0	0	0	0	0	0	0
Scoop tractor operator-motorman	0	0	0	0	0	10	0	0	8
Shuttle car operator	0	0	0	0	0	0	0	0	0
Truck driver	0	0	0	0	0	0	0	0	0
Total	3,067	5,308	6,226	9,741	1,218	5,383	2,881	26,023	484

Job title grouping[2]	Locomotive mine car	Longwall and parts	Many equipment	Miscellaneous utility machine	Plant equipment	Rock duster pump	Roof bolting machine underground drill	Scale lab equipment controls	Scoop
Backhoe-crane-dragline-shovel operator	0	0	11	161	0	0	0	0	0
Beltman-belt cleaner-belt repairman	0	0	0	0	0	0	0	0	0
Blaster	0	0	0	0	0	0	0	0	0
Continuous miner and related machine operator	0	0	0	0	0	0	0	0	0
Deckhand-barge and dredge operator	0	0	0	82	153	0	0	0	0
Dozer-heavy and mobile equipment operator	9	0	0	0	0	0	0	0	0
Driller-auger operator	0	0	0	0	0	0	605	0	0
Electrician-wireman-lampman	26	0	0	0	0	0	0	0	0
Front-end loader operator	0	0	0	0	16	0	0	0	0
Grader-scraper operator	0	0	0	0	0	0	0	0	0
Laborer-miner-utility man	1,477	81	2,307	13,057	175	1,134	178	12	1,008
Longwall operator	0	864	0	0	0	0	0	0	35
Manager-foreman-supervisor:									
General	38	0	427	0	59	0	0	0	10
Maintenance	0	0	0	0	0	0	0	0	0
Working	35	0	144	0	31	0	0	2	25
Mechanic-welder-oiler-machinist	0	0	0	0	0	0	0	0	0
Mine technical support	44	0	0	0	2	0	10	1,942	4
Office worker	0	0	0	0	0	0	0	0	0
Plant operator-warehouseman	141	0	0	0	3,809	0	0	253	0
Roof bolter-rock driller	0	0	0	0	0	0	8,075	0	0
Scoop tractor operator-motorman	2,246	0	0	0	0	0	0	0	2,771
Shuttle car operator	0	0	0	0	0	0	0	0	0
Truck driver	0	0	0	0	0	0	0	0	0
Total	4,016	945	2,888	13,300	4,245	1,134	8,868	2,208	3,853

See explanatory notes at end of table.

TABLE E-16.—Coal mining 1986 workforce estimates: job title, by principal equipment operated[1], number of workers—Con.

Job title grouping[2]	Shuttle car	Surface drill auger	Truck (haulage)	Truck (utility) personnel carrier	Welding machine lathe	None	Unspecified not elsewhere classified	Total
Backhoe-crane-dragline-shovel operator	0	0	0	0	0	0	0	3,013
Beltman-belt cleaner-belt repairman	0	0	0	0	0	0	0	5,221
Blaster	0	0	0	0	0	0	0	1,218
Continuous miner and related machine operator	0	0	0	0	0	287	0	6,437
Deckhand-barge and dredge operator	0	0	0	0	0	0	0	235
Dozer-heavy and mobile equipment operator	0	14	276	0	0	0	0	10,580
Driller-auger operator	0	2,088	0	0	0	179	0	2,872
Electrician-wireman-lampman	0	0	0	35	0	0	0	6,205
Front-end loader operator	0	0	0	0	0	0	0	4,324
Grader-scraper operator	0	0	0	0	0	0	0	2,459
Laborer-miner-utility man	57	15	32	1,058	0	599	161	23,267
Longwall operator	0	0	0	0	0	138	0	1,036
Manager-foreman-supervisor:								
General	0	30	16	297	0	8,205	0	9,400
Maintenance	0	0	0	206	0	2,046	0	2,252
Working	0	0	0	226	26	4,986	0	5,521
Mechanic-welder-oiler-machinist	0	0	0	28	4,483	0	0	23,237
Mine technical support	0	0	0	374	0	4,051	10	6,797
Office worker	0	0	0	64	0	5,278	0	5,342
Plant operator-warehouseman	0	0	0	29	0	1,317	22	5,895
Roof bolter-rock driller	0	0	0	0	0	132	0	8,206
Scoop tractor operator-motorman	0	0	0	241	0	2	0	5,277
Shuttle car operator	5,646	0	0	0	0	0	0	5,646
Truck driver	0	0	7,297	0	0	0	0	7,297
Total	5,703	2,147	7,621	2,558	4,509	27,220	192	151,737

[1]See appendix B for detailed explanation of equipment operated grouping.
[2]As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E–17.—Coal mining 1986 workforce estimates: job title, by work location at mine, number of workers

Job title grouping[1]	Underground mine	Surface at underground mine	Surface mine	Plant or mill	Office	Total
Backhoe-crane-dragline-shovel operator	0	41	2,936	36	0	3,013
Beltman-belt cleaner-belt repairman	4,994	110	41	75	0	5,221
Blaster	414	0	804	0	0	1,218
Continuous miner and related machine operator	6,437	0	0	0	0	6,437
Deckhand-barge and dredge operator	0	9	105	121	0	235
Dozer-heavy and mobile equipment operator	0	967	8,967	646	0	10,580
Driller-auger operator	605	0	2,266	0	0	2,872
Electrician-wireman-lampman	3,488	695	1,404	618	0	6,205
Front-end loader operator	0	340	3,245	738	0	4,324
Grader-scraper operator	0	104	2,299	55	0	2,459
Laborer-miner-utility man	16,233	1,625	3,879	1,529	0	23,267
Longwall operator	1,036	0	0	0	0	1,036
Manager-foreman-supervisor:						
General	4,151	631	3,262	1,110	246	9,400
Maintenance	1,235	199	722	65	30	2,252
Working	3,928	126	1,065	392	10	5,521
Mechanic-welder-oiler-machinist	7,068	1,730	12,101	2,339	0	23,237
Mine technical support	1,611	1,412	1,394	751	1,629	6,797
Office worker	0	0	0	0	5,342	5,342
Plant operator-warehouseman	77	558	1,051	3,713	497	5,895
Roof bolter-rock driller	8,191	0	15	0	0	8,206
Scoop tractor operator-motorman	4,748	55	142	332	0	5,277
Shuttle car operator	5,646	0	0	0	0	5,646
Truck driver	0	275	6,591	431	0	7,297
Total	69,863	8,878	52,291	12,952	7,753	151,737

[1]As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E–18.—Coal mining 1986 workforce estimates: job title, by years of experience at job

Job title grouping[1]	0< to ≤1	1< to ≤2	2< to ≤3	3< to ≤5	5< to ≤10	10< to ≤20	20<	Unspecified	Total	Median, yr
Backhoe-crane-dragline-shovel operator	479	244	281	482	579	542	173	234	3,013	5
Beltman-belt cleaner-belt repairman	1,237	930	611	940	952	258	4	290	5,221	3
Blaster	309	206	112	147	247	133	8	57	1,218	3
Continuous miner and related machine operator	1,370	1,039	488	947	1,621	558	28	385	6,437	4
Deckhand-barge and dredge operator	41	49	15	0	70	23	7	30	235	3
Dozer-heavy and mobile equipment operator	1,627	1,327	891	1,324	2,891	1,083	128	1,309	10,580	5
Driller-auger operator	529	327	332	496	673	241	9	265	2,872	4
Electrician-wireman-lampman	867	633	559	1,101	1,636	912	71	426	6,205	5
Front-end loader operator	588	509	462	646	957	601	91	471	4,324	5
Grader-scraper operator	701	290	227	409	530	205	0	98	2,459	3
Laborer-miner-utility man	5,801	3,967	2,111	3,318	3,951	1,746	173	2,198	23,267	3
Longwall operator	318	191	166	98	229	35	0	0	1,036	3
Manager-foreman-supervisor:										
General	1,289	893	893	1,429	2,341	1,358	278	919	9,400	5
Maintenance	371	323	216	296	659	245	23	120	2,252	5
Working	873	886	327	710	1,626	728	80	291	5,521	5
Mechanic-welder-oiler-machinist	3,195	3,094	1,818	3,418	6,729	2,940	306	1,737	23,237	5
Mine technical support	1,043	1,222	1,025	1,095	1,393	422	47	552	6,797	3
Office worker	770	778	607	1,005	1,255	405	92	430	5,342	4
Plant operator-warehouseman	812	735	409	1,058	1,670	574	89	548	5,895	5
Roof bolter-rock driller	1,545	1,167	781	1,352	1,944	739	36	643	8,206	4
Scoop tractor operator-motorman	1,081	996	624	874	873	269	18	541	5,277	3
Shuttle car operator	1,214	898	624	784	1,368	313	9	436	5,646	3
Truck driver	939	1,195	853	1,204	1,712	470	148	777	7,297	4
Total	27,001	21,898	14,431	23,133	35,906	14,797	1,815	12,756	151,737	4

[1]As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E-19.—Coal mining 1986 workforce estimates: job title, by years of experience at company

Job title grouping[1]	0< to ≤1	1< to ≤5	5< to ≤10	10< to ≤15	15< to ≤20	20< to ≤25	25< to ≤30	30<	Unspecified	Total	Median, yr
Backhoe-crane-dragline-shovel operator	178	739	678	813	212	160	57	93	82	3,013	10
Beltman-belt cleaner-belt repairman	463	1,089	1,284	1,746	426	131	0	27	55	5,221	10
Blaster	138	399	435	131	63	22	15	8	7	1,218	7
Continuous miner and related machine operator	496	1,190	1,580	2,317	637	103	0	51	63	6,437	10
Deckhand-barge and dredge operator	37	12	75	24	36	4	20	12	15	235	9
Dozer-heavy and mobile equipment operator	627	2,719	3,929	1,598	932	199	84	205	288	10,580	8
Driller-auger operator	269	967	982	395	66	34	33	10	116	2,872	6
Electrician-wireman-lampman	349	1,219	1,977	1,445	676	145	78	249	67	6,205	9
Front-end loader operator	349	1,575	1,165	719	176	56	28	28	229	4,324	6
Grader-scraper operator	255	637	805	525	155	30	20	3	29	2,459	8
Laborer-miner-utility man	1,866	6,378	7,066	4,983	1,650	443	94	478	308	23,267	8
Longwall operator	0	88	311	498	87	26	26	0	0	1,036	11
Manager-foreman-supervisor:											
General	805	2,191	2,409	2,252	838	202	83	307	314	9,400	8
Maintenance	135	416	648	650	240	87	48	28	0	2,252	10
Working	300	918	1,277	1,661	987	133	50	136	59	5,521	11
Mechanic-welder-oiler-machinist	1,548	4,641	7,644	5,804	2,231	394	242	453	281	23,237	9
Mine technical support	581	2,352	1,909	1,165	416	92	35	226	21	6,797	6
Office worker	623	1,842	1,610	610	279	38	46	83	211	5,342	6
Plant operator-warehouseman	367	1,212	2,110	1,041	586	195	58	233	94	5,895	8
Roof bolter-rock driller	830	1,883	2,127	2,452	694	3	0	60	157	8,206	8
Scoop tractor operator-motorman	414	1,328	1,427	1,377	452	39	37	86	116	5,277	8
Shuttle car operator	404	1,197	1,932	1,541	441	45	17	26	43	5,646	8
Truck driver	547	3,043	2,274	647	306	74	78	77	251	7,297	5
Total	11,581	38,035	45,654	34,393	12,586	2,656	1,148	2,878	2,806	151,737	8

[1]As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E-20.—Coal mining 1986 workforce estimates: job title, by years of mining experience

Job title grouping[1]	0< to ≤1	1< to ≤5	5< to ≤10	10< to ≤15	15< to ≤20	20< to ≤25	25< to ≤30	30<	Unspecified	Total	Median, Yr
Backhoe-crane-dragline-shovel operator	108	338	650	654	268	216	101	190	488	3,013	12
Beltman-belt cleaner-belt repairman	146	554	1,270	1,661	479	76	89	136	811	5,221	11
Blaster	3	177	461	184	106	58	46	8	177	1,218	10
Continuous miner and related machine operator	119	293	1,681	2,219	744	145	37	142	1,055	6,437	12
Deckhand-barge and dredge operator	37	24	67	6	44	4	20	15	18	235	9
Dozer-heavy and mobile equipment operator	194	1,075	2,996	1,660	1,150	340	150	279	2,736	10,580	10
Driller-auger operator	89	440	1,014	550	100	46	89	10	533	2,872	8
Electrician-wireman-lampman	138	308	1,593	1,717	650	191	235	350	1,021	6,205	12
Front-end loader operator	125	675	1,142	749	426	158	51	73	923	4,324	10
Grader-scraper operator	166	425	780	441	213	38	18	5	373	2,459	9
Laborer-miner-utility man	677	3,543	6,276	4,957	1,892	627	144	560	4,589	23,267	10
Longwall operator	0	18	299	367	61	117	17	35	122	1,036	12
Manager-foreman-supervisor:											
General	93	470	1,885	2,447	1,392	681	266	557	1,611	9,400	13
Maintenance	16	64	484	710	409	134	69	98	268	2,252	13
Working	66	316	831	1,524	829	256	123	187	1,390	5,521	13
Mechanic-welder-oiler-machinist	545	2,559	6,583	5,555	2,271	679	321	653	4,071	23,237	10
Mine technical support	282	1,384	1,814	1,221	498	83	108	308	1,100	6,797	8
Office worker	365	1,158	1,511	697	229	87	55	104	1,136	5,342	7
Plant operator-warehouseman	176	660	1,752	971	659	217	106	322	1,033	5,895	10
Roof bolter-rock driller	89	767	2,287	2,598	757	129	55	117	1,407	8,206	11
Scoop tractor operator-motorman	76	557	1,379	1,409	586	127	33	160	950	5,277	11
Shuttle car operator	135	587	1,620	1,578	412	136	65	53	1,060	5,646	10
Truck driver	150	1,659	2,050	775	320	153	113	143	1,936	7,297	7
Total	3,795	18,048	40,425	34,652	14,495	4,697	2,312	4,505	28,808	151,737	10

[1]As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E–21.—Coal mining 1986 workforce estimates: job title, by hours of training received in last 2 yr

Job title grouping[1]	0	1–8	9–15	16	17–40	41–80	81–160	161+	Unspecified	Total	Mean, h
Backhoe-crane-dragline-shovel operator	185	87	31	1,301	389	278	113	141	489	3,013	40
Beltman-belt cleaner-belt repairman	92	381	50	1,668	1,663	420	130	15	801	5,221	27
Blaster	0	53	0	337	394	180	29	0	225	1,218	31
Continuous miner and related machine operator	120	370	167	2,469	1,703	245	145	32	1,187	6,437	25
Deckhand-barge and dredge operator	0	25	0	112	20	31	12	0	35	235	26
Dozer-heavy and mobile equipment operator	662	370	111	4,084	1,324	634	230	68	3,097	10,580	26
Driller-auger operator	105	146	27	1,063	558	192	60	23	693	2,872	27
Electrician-wireman-lampman	159	139	68	1,261	1,351	1,353	263	214	1,397	6,205	51
Front-end loader operator	107	150	71	2,038	621	293	102	12	930	4,324	26
Grader-scraper operator	75	113	22	1,124	442	164	81	28	410	2,459	29
Laborer-miner-utility man	609	1,257	270	8,218	5,039	1,412	1,028	327	5,107	23,267	30
Longwall operator	0	27	0	484	125	104	36	35	226	1,036	39
Manager-foreman-supervisor:											
General	213	158	130	2,030	2,469	1,353	626	263	2,158	9,400	44
Maintenance	59	60	104	211	501	521	360	76	360	2,252	59
Working	97	91	191	952	1,130	1,068	723	364	906	5,521	63
Mechanic-welder-oiler- machinist	676	825	268	7,267	5,036	3,200	546	489	3,931	23,237	40
Mine technical support	459	386	77	1,763	1,158	841	365	122	1,627	6,797	37
Office worker	951	424	74	707	573	361	304	110	1,838	5,342	33
Plant operator-warehouseman	267	447	122	1,946	927	421	116	242	1,406	5,895	46
Roof bolter-rock driller	101	410	69	2,983	2,334	554	197	34	1,525	8,206	27
Scoop tractor operator-motorman	148	446	113	1,922	1,110	179	110	27	1,221	5,277	23
Shuttle car operator	64	234	87	1,937	1,674	302	92	25	1,231	5,646	28
Truck driver	125	257	114	2,568	1,336	474	300	133	1,991	7,297	33
Total	5,275	6,857	2,166	48,445	31,876	14,577	5,966	2,783	33,791	151,737	35

[1]As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E–22.—Coal mining 1986 workforce estimates: job title, by years of age

Job title grouping[1]	15–20	21–23	24–26	27–29	30–34	35–39	40–49	50 +	Unspecified	Total	Mean, yr
Backhoe-crane-dragline-shovel operator	4	30	142	162	490	440	878	792	75	3,013	43
Beltman-belt cleaner-belt repairman	72	121	329	580	933	954	1,274	891	65	5,221	39
Blaster	0	78	101	156	255	188	259	143	39	1,218	36
Continuous miner and related machine operator	0	46	334	731	1,828	1,188	1,558	705	46	6,437	37
Deckhand-barge and dredge operator	0	12	0	24	44	3	68	71	12	235	44
Dozer-heavy and mobile equipment operator	20	66	478	811	2,129	2,058	2,733	2,063	223	10,580	40
Driller-auger operator	19	104	217	424	653	470	531	398	54	2,872	37
Electrician-wireman-lampman	5	12	85	374	1,409	1,556	1,667	1,058	38	6,205	40
Front-end loader operator	51	130	309	430	788	749	1,117	709	40	4,324	38
Grader-scraper operator	22	53	149	291	577	557	495	314	2	2,459	37
Laborer-miner-utility man	273	931	1,506	3,080	5,280	4,146	4,526	3,321	205	23,267	37
Longwall operator	0	0	53	205	219	223	167	170	0	1,036	38
Manager-foreman-supervisor:											
General	0	20	128	589	1,462	2,178	3,075	1,766	183	9,400	41
Maintenance	0	0	0	46	387	519	829	462	10	2,252	42
Working	11	7	47	242	1,111	1,531	1,850	721	0	5,521	40
Mechanic-welder-oiler- machinist	41	400	1,039	2,089	5,193	4,513	5,648	4,069	245	23,237	39
Mine technical support	71	190	502	690	1,508	1,383	995	1,339	119	6,797	38
Office worker	83	236	447	388	953	1,126	1,118	909	83	5,342	38
Plant operator-warehouseman	21	60	274	451	1,159	1,069	1,510	1,242	109	5,895	41
Roof bolter-rock driller	31	226	601	925	2,156	2,088	1,283	827	70	8,206	36
Scoop tractor operator-motorman	0	163	409	700	1,211	861	1,047	785	101	5,277	37
Shuttle car operator	70	141	435	766	1,626	784	1,222	601	0	5,646	36
Truck driver	54	249	741	959	1,247	1,097	1,708	1,011	232	7,297	37
Total	848	3,276	8,326	15,113	32,618	29,680	35,559	24,367	1,949	151,737	39

[1]As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E-23.—Coal mining 1986 workforce estimates: job title, by sex

Job title grouping[1]	Male		Female		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Backhoe-crane-dragline-shovel operator	2,922	2	40	1	51	7	3,013	2
Beltman-belt cleaner-belt repairman	4,955	3	228	4	37	5	5,221	3
Blaster	1,191	1	20	0	8	1	1,218	1
Continuous miner and related machine operator	6,364	4	73	1	0	0	6,437	4
Deckhand-barge and dredge operator	235	0	0	0	0	0	235	0
Dozer-heavy and mobile equipment operator	10,408	7	23	0	149	20	10,580	7
Driller-auger operator	2,824	2	40	1	8	1	2,872	2
Electrician-wireman-lampman	6,178	4	19	0	8	1	6,205	4
Front-end loader operator	4,302	3	12	0	9	1	4,324	3
Grader-scraper operator	2,429	2	23	0	7	1	2,459	2
Laborer-miner-utility man	22,245	15	962	16	60	8	23,267	15
Longwall operator	1,027	1	9	0	0	0	1,036	1
Manager-foreman-supervisor:								
General	9,227	6	102	2	72	9	9,400	6
Maintenance	2,252	2	0	0	0	0	2,252	1
Working	5,431	4	47	1	43	6	5,521	4
Mechanic-welder-oiler-machinist	23,024	16	113	2	101	13	23,237	15
Mine technical support	6,168	4	622	10	8	1	6,797	4
Office worker	2,497	2	2,792	46	54	7	5,342	4
Plant operator-warehouseman	5,470	4	367	6	58	8	5,895	4
Roof bolter-rock driller	8,097	6	110	2	0	0	8,206	5
Scoop tractor operator-motorman	5,149	4	127	2	0	0	5,277	3
Shuttle car operator	5,522	4	123	2	0	0	5,646	4
Truck driver	6,941	5	269	4	88	12	7,297	5
Total	144,859	100	6,119	100	758	100	151,737	100

[1]As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E-24.—Coal mining 1986 workforce estimates: job title, by race

Job title grouping[1]	White		Black		Hispanic		Other		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Backhoe-crane-dragline-shovel operator	2,804	2	15	0	23	2	85	3	86	4	3,013	2
Beltman-belt cleaner-belt repairman	4,903	3	222	6	45	5	15	0	37	2	5,221	3
Blaster	1,054	1	0	0	3	0	94	3	67	4	1,218	1
Continuous miner and related machine operator	6,102	4	308	8	17	2	0	0	9	0	6,437	4
Deckhand-barge and dredge operator	235	0	0	0	0	0	0	0	0	0	235	0
Dozer-heavy and mobile equipment operator	9,731	7	183	5	52	6	273	9	342	18	10,580	7
Driller-auger operator	2,599	2	48	1	23	2	120	4	82	4	2,872	2
Electrician-wireman-lampman	5,857	4	172	5	39	4	129	4	8	0	6,205	4
Front-end loader operator	4,167	3	18	0	68	7	0	0	72	4	4,324	3
Grader-scraper operator	2,197	2	60	2	15	2	166	6	19	1	2,459	2
Laborer-miner-utility man	21,554	15	1,122	30	96	10	344	12	151	8	23,267	15
Longwall operator	1,018	1	0	0	18	2	0	0	0	0	1,036	1
Manager-foreman-supervisor:												
General	9,045	6	87	2	14	1	83	3	172	9	9,400	6
Maintenance	2,208	2	0	0	29	3	8	0	8	0	2,252	1
Working	5,230	4	117	3	59	6	73	2	43	2	5,521	4
Mechanic-welder-oiler-machinist	21,699	15	261	7	181	19	859	29	237	12	23,237	15
Mine technical support	6,375	4	133	4	33	3	167	6	90	5	6,797	4
Office worker	5,086	4	86	2	23	2	49	2	97	5	5,342	4
Plant operator-warehouseman	5,551	4	73	2	59	6	109	4	103	5	5,895	4
Roof bolter-rock driller	7,811	5	298	8	27	3	70	2	0	0	8,206	5
Scoop tractor operator-motorman	5,089	4	178	5	9	1	0	0	0	0	5,277	3
Shuttle car operator	5,410	4	228	6	9	1	0	0	0	0	5,646	4
Truck driver	6,483	5	90	2	101	11	336	11	288	15	7,297	5
Total	142,206	100	3,699	100	941	100	2,981	100	1,910	100	151,737	100

[1]As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E–25.—Coal mining 1986 workforce estimates: job title, by education

Job title grouping[1]	Some elementary		Some high school		High school diploma		Vocational diploma		Some college		College degree		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Backhoe-crane-dragline shovel operator	112	4	423	14	1,634	54	156	5	261	9	35	1	392	13	3,013	100
Beltman-belt cleaner-belt repairman	529	10	1,020	20	2,227	43	366	7	217	4	74	1	787	15	5,221	100
Blaster	157	13	205	17	499	41	90	7	114	9	38	3	115	9	1,218	100
Continuous miner and related machine operator	617	10	1,336	21	2,863	44	257	4	350	5	39	1	975	15	6,437	100
Deckhand-barge and dredge operator	33	14	24	10	110	47	40	17	12	5	0	0	15	7	235	100
Dozer-heavy and mobile equipment operator	525	5	1,615	15	5,118	48	460	4	553	5	162	2	2,147	20	10,580	100
Driller-auger operator	285	10	333	12	1,417	49	208	7	134	5	110	4	385	13	2,872	100
Electrician-wireman-lampman	312	5	728	12	2,250	36	967	16	705	11	191	3	1,052	17	6,205	100
Front-end loader operator	282	7	701	16	2,397	55	222	5	177	4	56	1	489	11	4,324	100
Grader-scraper operator	84	3	232	9	1,582	64	87	4	217	9	24	1	232	9	2,459	100
Laborer-miner-utility man	1,512	6	3,163	14	10,861	47	1,312	6	1,899	8	601	3	3,919	17	23,267	100
Longwall operator	124	12	213	21	407	39	106	10	81	8	0	0	106	10	1,036	100
Manager-foreman-supervisor:																
General	300	3	964	10	4,108	44	601	6	1,198	13	1,181	13	1,047	11	9,400	100
Maintenance	33	1	243	11	999	44	270	12	415	18	170	8	121	5	2,252	100
Working	101	2	492	9	2,733	50	298	5	693	13	634	11	570	10	5,521	100
Mechanic-welder-oiler-machinist	1,055	5	2,414	10	10,377	45	2,622	11	2,280	10	578	2	3,912	17	23,237	100
Mine technical support	205	3	505	7	1,941	29	482	7	1,015	15	1,937	28	712	10	6,797	100
Office worker	39	1	92	2	1,842	34	247	5	1,082	20	1,487	28	553	10	5,342	100
Plant operator-warehouseman	292	5	634	11	2,886	49	318	5	654	11	269	5	842	14	5,895	100
Roof bolter-rock driller	653	8	1,493	18	4,045	49	460	6	342	4	69	1	1,143	14	8,206	100
Scoop tractor operator-motorman	580	11	791	15	2,255	43	313	6	303	6	87	2	947	18	5,277	100
Shuttle car operator	431	8	879	16	2,977	53	178	3	355	6	52	1	774	14	5,646	100
Truck driver	249	3	970	13	3,726	51	557	8	470	6	111	2	1,213	17	7,297	100
Total	8,509	6	19,472	13	69,255	46	10,619	7	13,529	9	7,906	5	22,447	15	151,737	100

[1]As defined by MSHA: see appendix A for detailed explanation of job title grouping.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E-26.—Coal mining 1986 workforce estimates:[1] principal equipment operated, by years of experience at job

Equipment operated grouping[2]	0< to ≤1	1< to ≤2	2< to ≤3	3< to ≤5	5< to ≤10	10< to ≤20	20<	Unspecified	Total	Median, yr
Backhoe-crane-dragline-shovel	453	267	291	458	576	612	173	238	3,067	5
Belt	1,290	930	611	940	972	270	4	293	5,308	3
Continuous miner and related machinery	1,324	1,012	420	896	1,626	551	28	367	6,226	4
Dozer-heavy and mobile equipment	1,516	1,296	821	1,135	2,657	974	146	1,195	9,741	5
Explosives	309	206	112	147	247	133	8	57	1,218	3
Front-end loader-forklift	711	601	542	887	1,299	718	100	524	5,383	5
Grader-scraper	775	380	235	480	648	244	0	120	2,881	3
Handtools (powered and nonpowered)	3,764	3,498	2,234	4,261	6,982	3,167	317	1,801	26,023	5
Hoist	24	152	35	70	46	157	0	0	484	4
Locomotive-mine car	594	780	408	638	1,071	205	9	311	4,016	4
Longwalls and parts	290	219	166	63	163	44	0	0	945	2
Many equipment	259	448	193	234	431	591	99	634	2,888	5
Miscellaneous utility equipment	3,847	2,463	1,231	1,808	1,992	616	50	1,293	13,300	2
Plant equipment	733	555	280	648	1,112	411	84	421	4,245	4
Rock dusting machine-pump	300	156	112	228	297	37	0	4	1,134	3
Roof bolting machine-underground drill	1,693	1,230	820	1,566	2,055	802	36	665	8,868	4
Scale-lab equipment-controls	361	357	212	375	480	116	19	288	2,208	4
Scoop	1,166	512	435	766	489	250	9	225	3,853	3
Shuttle car	1,223	898	659	784	1,377	316	9	436	5,703	3
Surface drill-auger	375	232	235	323	558	202	9	212	2,147	5
Truck (haulage)	1,033	1,220	914	1,243	1,758	487	148	819	7,621	4
Truck (utility)-personnel carrier	304	399	424	214	599	275	92	187	2,494	4
Welding machine-lathe	449	461	232	497	1,553	799	85	434	4,509	7
None	3,406	2,830	2,192	3,468	5,652	2,308	288	1,799	21,942	5
Unspecified-not elsewhere classified	30	17	11	0	12	107	12	3	192	11
Total	26,230	21,120	13,824	22,129	34,651	14,392	1,723	12,325	146,395	4

[1]Excluding job title category of office workers.
[2]See appendix B for detailed explanation of equipment operated grouping.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E-27.—Coal mining 1986 workforce estimates:[1] principal equipment operated, by hours of training received in last 2 yr

Equipment operated grouping[2]	0	1–8	9–15	16	17–40	41–80	81–160	161+	Unspecified	Total	Mean, h
Backhoe-crane-dragline-shovel	185	87	31	1,365	388	270	105	72	564	3,067	33
Belt	92	403	50	1,700	1,698	420	130	15	801	5,308	27
Continuous miner and related machinery	120	339	157	2,330	1,693	254	154	32	1,147	6,226	26
Dozer-heavy and mobile equipment	647	379	14	3,809	1,284	573	242	68	2,725	9,741	26
Explosives	0	53	0	337	394	180	29	0	225	1,218	31
Front-end loader-forklift	152	187	160	2,256	966	328	132	77	1,126	5,383	30
Grader-scraper	75	113	22	1,258	456	218	81	28	629	2,881	29
Handtools (powered and nonpowered)	727	671	376	7,277	6,097	4,171	804	689	5,212	26,023	44
Hoist	4	55	0	236	123	31	0	0	35	484	22
Locomotive-mine car	96	343	119	1,570	850	154	105	61	718	4,016	27
Longwalls and parts	0	27	0	430	180	104	36	35	134	945	39
Many equipment	21	305	17	511	410	261	124	160	1,080	2,888	43
Miscellaneous utility equipment	330	691	110	4,872	2,783	589	669	197	3,058	13,300	31
Plant equipment	165	333	89	1,511	575	318	46	131	1,077	4,245	45
Rock dusting machine-pump	74	45	0	420	290	133	11	15	146	1,134	27
Roof bolting machine-underground drill	101	483	69	3,135	2,622	601	250	34	1,573	8,868	27
Scale-lab equipment-controls	143	103	18	839	320	141	41	8	595	2,208	24
Scoop	92	210	59	1,394	826	252	216	27	776	3,853	30
Shuttle car	64	234	87	1,940	1,718	302	92	25	1,240	5,703	28
Surface drill-auger	68	79	27	825	323	199	39	28	560	2,147	29
Truck (haulage)	125	264	132	2,676	1,378	518	307	133	2,087	7,621	33
Truck (utility)-personnel carrier	149	60	69	779	573	241	181	25	417	2,494	35
Welding machine-lathe	211	333	27	1,533	586	433	22	14	1,349	4,509	25
None	645	629	459	4,663	4,751	3,496	1,849	801	4,650	21,942	49
Unspecified-not elsewhere classified	37	7	0	72	18	29	0	0	28	192	22
Total	4,324	6,432	2,092	47,738	31,303	14,216	5,662	2,673	31,953	146,395	35

[1]Excluding job title category of office workers.
[2]See appendix B for detailed explanation of equipment operated grouping.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E-28.—Coal mining 1986 workforce estimates:[1] principal equipment operated, by years of age

Equipment operated grouping[2]	15–20	21–23	24–26	27–29	30–34	35–39	40–49	50+	Unspecified	Total	Mean, yr
Backhoe-crane-dragline-shovel	4	27	111	156	457	479	941	819	75	3,067	43
Belt	93	131	339	593	954	967	1,274	891	65	5,308	39
Continuous miner and related machinery	0	37	323	721	1,759	1,144	1,488	710	46	6,226	37
Dozer-heavy and mobile equipment	20	51	441	807	1,885	1,938	2,402	2,001	197	9,741	40
Explosives	0	78	101	156	255	188	259	143	39	1,218	36
Front-end loader-forklift	62	161	368	476	1,040	988	1,439	790	59	5,383	38
Grader-scraper	22	53	179	329	668	625	616	380	9	2,881	37
Handtools (powered and nonpowered)	58	446	1,107	2,227	5,753	5,463	6,271	4,433	264	26,023	39
Hoist	0	8	0	0	51	71	68	277	8	484	48
Locomotive-mine car	0	8	36	382	778	868	854	1,060	31	4,016	41
Longwalls and parts	0	0	62	205	197	206	177	98	0	945	36
Many equipment	0	53	111	334	609	491	780	511	0	2,888	40
Miscellaneous utility equipment	154	648	1,033	1,742	3,182	2,385	2,489	1,495	172	13,300	36
Plant equipment	20	75	149	330	800	710	1,140	911	108	4,245	41
Rock dusting machine-pump	0	15	27	178	284	231	298	100	2	1,134	37
Roof bolting machine-underground drill	31	261	654	1,057	2,281	2,194	1,417	868	105	8,868	36
Scale-lab equipment-controls	31	72	268	289	491	396	304	287	70	2,208	36
Scoop	9	135	430	743	994	565	625	281	70	3,853	35
Shuttle car	70	141	435	793	1,639	793	1,231	601	0	5,703	36
Surface drill-auger	19	60	179	273	519	334	422	322	19	2,147	37
Truck (haulage)	54	265	759	968	1,316	1,147	1,794	1,083	235	7,621	37
Truck (utility)-personnel carrier	44	111	114	206	461	425	611	503	19	2,494	40
Welding machine-lathe	2	44	135	402	1,052	774	1,260	821	19	4,509	40
None	51	161	512	1,347	4,221	5,171	6,270	3,956	254	21,942	41
Unspecified-not elsewhere classified	20	0	7	13	20	3	12	117	0	192	46
Total	765	3,040	7,879	14,725	31,665	28,554	34,441	23,459	1,866	146,395	39

[1]Excluding job title category of office workers.
[2]See appendix B for detailed explanation of equipment operated grouping.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E-29.—Coal mining 1986 workforce estimates:[1] principal equipment operated, by sex

Equipment operated grouping[2]	Male		Female		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Backhoe-crane-dragline-shovel	2,992	2	25	1	51	7	3,067	2
Belt	5,043	4	228	7	37	5	5,308	4
Continuous miner and related machinery	6,153	4	73	2	0	0	6,226	4
Dozer-heavy and mobile equipment	9,581	7	19	1	141	20	9,741	7
Explosives	1,191	1	20	1	8	1	1,218	1
Front-end loader-forklift	5,289	4	85	3	9	1	5,383	4
Grader-scraper	2,843	2	30	1	7	1	2,881	2
Handtools (powered and nonpowered)	25,718	18	205	6	101	14	26,023	18
Hoist	480	0	4	0	0	0	484	0
Locomotive-mine car	3,935	3	81	2	0	0	4,016	3
Longwalls and parts	936	1	9	0	0	0	945	1
Many equipment	2,739	2	141	4	8	1	2,888	2
Miscellaneous utility equipment	12,665	9	582	17	52	7	13,300	9
Plant equipment	4,133	3	79	2	33	5	4,245	3
Rock dusting machine-pump	1,117	1	17	1	0	0	1,134	1
Roof bolting machine-underground drill	8,741	6	127	4	0	0	8,868	6
Scale-lab equipment-controls	1,863	1	345	10	0	0	2,208	2
Scoop	3,707	3	145	4	0	0	3,853	3
Shuttle car	5,580	4	123	4	0	0	5,703	4
Surface drill-auger	2,117	1	22	1	8	1	2,147	1
Truck (haulage)	7,256	5	269	8	96	14	7,621	5
Truck (utility)-personnel carrier	2,399	2	92	3	4	0	2,494	2
Welding machine-lathe	4,501	3	0	0	8	1	4,509	3
None	21,191	15	607	18	144	20	21,942	15
Unspecified-not elsewhere classified	192	0	0	0	0	0	192	0
Total	142,363	100	3,328	100	704	100	146,395	100

[1]Excluding job title category of office workers.
[2]See appendix B for detailed explanation of equipment operated grouping.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E-30.—Coal mining 1986 workforce estimates:[1] principal equipment operated, by race

Equipment operated grouping[2]	White		Black		Hispanic		Other		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Backhoe-crane-dragline-shovel	2,866	2	15	0	15	2	85	3	86	5	3,067	2
Belt	4,990	4	222	6	45	5	15	1	37	2	5,308	4
Continuous miner and related machinery	5,928	4	271	8	17	2	0	0	9	1	6,226	4
Dozer-heavy and mobile equipment	8,907	6	166	5	52	6	267	9	350	19	9,741	7
Explosives	1,054	1	0	0	3	0	94	3	67	4	1,218	1
Front-end loader-forklift	5,176	4	52	1	68	7	0	0	88	5	5,383	4
Grader-scraper	2,601	2	76	2	15	2	169	6	19	1	2,881	2
Handtools (powered and nonpowered)	24,513	18	477	13	199	22	613	21	222	12	26,023	18
Hoist	465	0	19	1	0	0	0	0	0	0	484	0
Locomotive-mine car	3,697	3	282	8	0	0	0	0	37	2	4,016	3
Longwalls and parts	918	1	0	0	27	3	0	0	0	0	945	1
Many equipment	2,742	2	129	4	15	2	0	0	3	0	2,888	2
Miscellaneous utility equipment	12,313	9	581	16	51	6	299	10	56	3	13,300	9
Plant equipment	4,064	3	33	1	51	6	30	1	68	4	4,245	3
Rock dusting machine-pump	1,076	1	58	2	0	0	0	0	0	0	1,134	1
Roof bolting machine-underground drill	8,455	6	316	9	27	3	70	2	0	0	8,868	6
Scale-lab equipment-controls	2,009	1	18	1	3	0	107	4	70	4	2,208	2
Scoop	3,699	3	110	3	26	3	0	0	18	1	3,853	3
Shuttle car	5,467	4	228	6	9	1	0	0	0	0	5,703	4
Surface drill-auger	1,922	1	15	0	23	2	105	4	82	5	2,147	1
Truck (haulage)	6,795	5	90	3	101	11	339	12	295	16	7,621	5
Truck (utility)-personnel carrier	2,249	2	38	1	17	2	150	5	40	2	2,494	2
Welding machine-lathe	4,044	3	11	0	30	3	401	14	23	1	4,509	3
None	20,994	15	394	11	123	13	187	6	244	13	21,942	15
Unspecified-not elsewhere classified	178	0	14	0	0	0	0	0	0	0	192	0
Total	137,120	100	3,612	100	917	100	2,932	100	1,814	100	146,395	100

[1]Excluding job title category of office workers.
[2]See appendix B for detailed explanation of equipment operated grouping.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E-31.—Coal mining 1986 workforce estimates:[1] principal equipment operated, by education

Equipment operated grouping[2]	Some elementary		Some high school		High school diploma		Vocational diploma		Some college		College degree		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Backhoe-crane-dragline-shovel	112	4	420	14	1,641	53	163	5	242	8	27	1	463	15	3,067	100
Belt	529	10	1,030	19	2,271	43	400	8	217	4	74	1	787	15	5,308	100
Continuous miner and related machinery	623	10	1,238	20	2,793	45	247	4	345	6	39	1	941	15	6,226	100
Dozer-heavy and mobile equipment	459	5	1,594	16	4,572	47	438	4	583	6	157	2	1,940	20	9,741	100
Explosives	157	13	205	17	499	41	90	7	114	9	38	3	115	9	1,218	100
Front-end loader-forklift	323	6	828	15	2,994	56	276	5	296	5	103	2	563	10	5,383	100
Grader-scraper	104	4	265	9	1,833	64	128	4	234	8	24	1	292	10	2,881	100
Handtools (powered and nonpowered)	1,272	5	3,064	12	11,186	43	2,856	11	2,689	10	631	2	4,324	17	26,023	100
Hoist	19	4	110	23	244	50	37	8	17	4	0	0	56	12	484	100
Locomotive-mine car	353	9	576	14	1,784	44	225	6	300	7	52	1	726	18	4,016	100
Longwalls and parts	96	10	162	17	398	42	124	13	61	6	0	0	106	11	945	100
Many equipment	49	2	250	9	1,232	43	172	6	340	12	255	9	590	20	2,888	100
Miscellaneous utility equipment	787	6	1,700	13	6,187	47	719	5	987	7	339	3	2,581	19	13,300	100
Plant equipment	295	7	510	12	2,067	49	212	5	305	7	115	3	740	17	4,245	100
Rock dusting machine-pump	72	6	163	14	651	57	59	5	51	4	9	1	129	11	1,134	100
Roof bolting machine-underground drill	850	10	1,596	18	4,290	48	520	6	327	4	118	1	1,166	13	8,868	100
Scale-lab equipment-controls	49	2	129	6	807	37	154	7	424	19	370	17	275	12	2,208	100
Scoop	385	10	583	15	1,765	46	280	7	309	8	118	3	414	11	3,853	100
Shuttle car	434	8	897	16	3,013	53	178	3	355	6	52	1	774	14	5,703	100
Surface drill-auger	143	7	204	9	1,146	53	156	7	105	5	61	3	332	15	2,147	100
Truck (haulage)	273	4	1,032	14	3,863	51	572	8	470	6	123	2	1,287	17	7,621	100
Truck (utility)-personnel carrier	147	6	315	13	1,118	45	152	6	292	12	208	8	260	10	2,494	100
Welding machine-lathe	223	5	335	7	1,809	40	799	18	337	7	120	3	885	20	4,509	100
None	666	3	2,148	10	9,212	42	1,413	6	3,027	14	3,386	15	2,091	10	21,942	100
Unspecified-not elsewhere classified	50	26	25	13	40	21	0	0	20	10	0	0	57	30	192	100
Total	8,470	6	19,380	13	67,413	46	10,372	7	12,446	9	6,419	4	21,894	15	146,395	100

[1]Excluding job title category of office workers.
[2]See appendix B for detailed explanation of equipment operated grouping.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E-32.—Coal mining 1986 work force estimates: job, company, and mining experience, by work location

Experience, yr	Underground mine		Surface at underground mine		Surface mine		Plant or mill		Office		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
At present job:												
0< to ≤1	14,627	21	1,428	16	8,153	16	1,624	13	1,170	15	27,001	18
1< to ≤2	11,126	16	1,600	18	6,424	12	1,668	13	1,080	14	21,898	14
2< to ≤3	6,648	10	719	8	5,119	10	1,129	9	816	11	14,431	10
3< to ≤5	10,693	15	1,377	16	7,414	14	2,171	17	1,478	19	23,133	15
5< to ≤10	15,380	22	1,892	21	13,488	26	3,290	25	1,855	24	35,906	24
10< to ≤20	5,937	8	1,097	12	5,593	11	1,624	13	545	7	14,797	10
20<	326	0	81	1	1,046	2	235	2	128	2	1,815	1
Unspecified	5,126	7	684	8	5,053	10	1,211	9	682	9	12,756	8
Total	69,863	100	8,878	100	52,291	100	12,952	100	7,753	100	151,737	100
Median, yr	3	NAp	4	NAp	5	NAp	5	NAp	4	NAp	4	NAp
At present company:												
0< to ≤1	5,259	8	696	8	3,836	7	869	7	920	12	11,581	8
1< to ≤5	15,386	22	1,717	19	15,063	29	3,174	25	2,695	35	38,035	25
5< to ≤10	19,330	28	2,075	23	17,750	34	4,043	31	2,457	32	45,654	30
10< to ≤15	20,513	29	1,988	22	8,763	17	2,265	17	864	11	34,393	23
15< to ≤20	6,596	9	1,558	18	2,820	5	1,292	10	318	4	12,586	8
20< to ≤25	999	1	154	2	1,070	2	393	3	39	1	2,656	2
25< to ≤30	257	0	67	1	622	1	124	1	78	1	1,148	1
30<	778	1	569	6	808	2	616	5	108	1	2,878	2
Unspecified	746	1	53	1	1,559	3	175	1	274	4	2,806	2
Total	69,863	100	8,878	100	52,291	100	12,952	100	7,753	100	151,737	100
Median, yr	9	NAp	10	NAp	7	NAp	8	NAp	6	NAp	8	NAp
Total mining:												
0< to ≤1	912	1	366	4	1,583	3	442	3	493	6	3,795	3
1< to ≤5	6,055	9	989	11	7,841	15	1,527	12	1,637	21	18,048	12
5< to ≤10	17,319	25	1,544	17	15,826	30	3,426	26	2,309	30	40,425	27
10< to ≤15	20,933	30	1,716	19	8,666	17	2,320	18	1,018	13	34,652	23
15< to ≤20	7,674	11	1,414	16	3,517	7	1,569	12	321	4	14,495	10
20< to ≤25	1,978	3	345	4	1,714	3	573	4	87	1	4,697	3
25< to ≤30	845	1	189	2	893	2	287	2	98	1	2,312	2
30<	1,693	2	669	8	1,240	2	752	6	151	2	4,505	3
Unspecified	12,454	18	1,647	19	11,012	21	2,055	16	1,640	21	28,808	19
Total	69,863	100	8,878	100	52,291	100	12,952	100	7,753	100	151,737	100
Median, yr	11	NAp	12	NAp	9	NAp	11	NAp	7	NAp	10	NAp

NAp Not applicable.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E-33.—Coal mining 1986 workforce estimates: training received, by work location

Job training for last 2 yr, h	Underground mine		Surface at underground mine		Surface mine		Plant or mill		Office		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
0	1,225	2	285	3	1,997	4	520	4	1,248	16	5,275	3
1–8	3,206	5	463	5	1,826	3	817	6	545	7	6,857	5
9–15	998	1	194	2	538	1	314	2	123	2	2,166	1
16	20,728	30	2,657	30	18,383	35	5,388	42	1,290	17	48,445	32
17–40	18,781	27	2,270	26	7,919	15	2,086	16	821	11	31,876	21
41–80	7,180	10	997	11	4,868	9	912	7	620	8	14,577	10
81–160	3,434	5	234	3	1,567	3	321	2	409	5	5,966	4
161 +	1,170	2	36	0	1,224	2	217	2	136	2	2,783	2
Unspecified	13,141	19	1,743	20	13,969	27	2,377	18	2,561	33	33,791	22
Total	69,863	100	8,878	100	52,291	100	12,952	100	7,753	100	151,737	100
Mean training h	36	NAp	30	NAp	37	NAp	32	NAp	32	NAp	35	NAp

NAp Not applicable

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E-34.—Coal mining 1986 workforce estimates age distribution, by work location

Age, yr	Underground mine		Surface at underground mine		Surface mine		Plant or mill		Office		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
15–20	293	0	70	1	296	1	54	0	136	2	848	1
21–23	1,287	2	226	3	1,209	2	261	2	294	4	3,276	2
24–26	3,744	5	313	4	3,192	6	462	4	615	8	8,326	5
27–29	7,894	11	450	5	4,947	9	1,228	9	595	8	15,113	10
30–34	17,443	25	1,160	13	10,119	19	2,378	18	1,518	20	32,618	21
35–39	14,745	21	1,679	19	9,404	18	2,229	17	1,624	21	29,680	20
40–49	15,477	22	2,384	27	12,850	25	3,337	26	1,510	19	35,559	23
50 +	8,541	12	2,550	29	9,223	18	2,761	21	1,293	17	24,367	16
Unspecified	441	1	47	1	1,051	2	241	2	169	2	1,949	1
Total	69,863	100	8,878	100	52,291	100	12,952	100	7,753	100	151,737	100
Mean age yr	38	NAp	43	NAp	39	NAp	40	NAp	38	NAp	39	NAp

NAp Not applicable

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E-35.—Coal mining 1986 workforce estimates sex, race, and education, by work location

	Underground mine		Surface at underground mine		Surface mine		Plant or mill		Office		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Sex.												
Male	68,399	98	8,686	98	50,834	97	12,580	97	4,359	56	144,859	95
Female	1,464	2	155	2	919	2	242	2	3,340	43	6,119	4
Unspecified	0	0	37	0	538	1	129	1	54	1	758	0
Total	69,863	100	8,878	100	52,291	100	12,952	100	7,753	100	151,737	100
Race.												
White	66,835	96	8,696	98	47,011	90	12,334	95	7,330	95	142,206	94
Black	2,588	4	100	1	713	1	175	1	122	2	3,699	2
Hispanic	252	0	18	0	570	1	70	1	30	0	941	1
Other	88	0	26	0	2,516	5	254	2	96	1	2,981	2
Unspecified	99	0	37	0	1,480	3	119	1	176	2	1,910	1
Total	69,863	100	8,878	100	52,291	100	12,952	100	7,753	100	151,737	100
Education level:												
Some elementary	4,912	7	553	6	2,090	4	872	7	81	1	8,509	6
Some high school	10,406	15	1,085	12	6,136	12	1,636	13	209	3	19,472	13
High school diploma	32,384	46	3,685	42	24,696	47	5,968	46	2,523	33	69,255	46
Vocational diploma	4,104	6	753	8	4,451	9	915	7	396	5	10,619	7
Some college	5,410	8	789	9	4,807	9	1,073	8	1,451	19	13,529	9
College degree	2,381	3	583	7	2,107	4	511	4	2,324	30	7,906	5
Unspecified	10,267	15	1,431	16	8,003	15	1,977	15	770	10	22,447	15
Total	69,863	100	8,878	100	52,291	100	12,952	100	7,753	100	151,737	100

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E-36.—Coal mining 1986 workforce estimates:[1] experience at job, by hours of training received in last 2 yr

Experience at present job, yr	0	1–8	9–15	16	17–40	41–80	81–160	161+	Unspecified	Total	Mean, h
0< to ≤1:											
Workers	979	2,510	604	6,845	6,133	2,531	1,413	613	4,603	26,230	36
pct	4	10	2	26	23	10	5	2	18	100	NAp
1< to ≤2:											
Workers	564	2,057	335	6,836	4,604	1,858	933	523	3,410	21,120	36
pct	3	10	2	32	22	9	4	2	16	100	NAp
2< to ≤3:											
Workers	197	326	194	4,891	2,820	1,524	555	338	2,978	13,824	40
pct	1	2	1	35	20	11	4	2	22	100	NAp
3< to ≤5:											
Workers	627	340	398	7,711	5,207	2,367	1,032	428	4,018	22,129	38
pct	3	2	2	35	24	11	5	2	18	100	NAp
5< to ≤10:											
Workers	1,467	603	461	13,149	7,694	4,040	889	531	5,817	34,651	33
pct	4	2	1	38	22	12	3	2	17	100	NAp
10< to ≤20:											
Workers	343	364	77	5,197	3,255	1,451	379	55	3,272	14,392	29
pct	2	3	1	36	23	10	3	0	23	100	NAp
20<.											
Workers	72	44	24	506	397	152	95	32	402	1,723	36
pct	4	3	1	29	23	9	6	2	23	100	NAp
Unspecified:											
Workers	75	188	0	2,603	1,194	293	365	152	7,455	12,325	36
pct	1	2	0	21	10	2	3	1	60	100	NAp
Total:											
Workers	4,324	6,432	2,092	47,738	31,303	14,216	5,662	2,673	31,953	146,395	35
pct	3	4	1	33	21	10	4	2	22	100	NAp

NAp Not applicable.
[1]Excluding job title category of office workers.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E-37.—Coal mining 1986 workforce estimates:[1] experience at job, by years of age

Experience at present job, yr	15–20	21–23	24–26	27–29	30–34	35–39	40–49	50+	Unspecified	Total	Mean, yr
0< to ≤1:											
Workers	444	1,031	2,265	3,311	5,817	5,090	5,531	2,562	179	26,230	36
pct	2	4	9	13	22	19	21	10	1	100	NAp
1< to ≤2:											
Workers	179	745	1,592	2,475	5,074	4,376	3,997	2,624	58	21,120	37
pct	1	4	8	12	24	21	19	12	0	100	NAp
2< to ≤3:											
Workers	48	358	882	1,790	3,412	2,585	3,151	1,557	41	13,824	37
pct	0	3	6	13	25	19	23	11	0	100	NAp
3< to ≤5:											
Workers	5	481	1,366	2,726	5,031	4,341	5,072	3,033	74	22,129	38
pct	0	2	6	12	23	20	23	14	0	100	NAp
5< to ≤10:											
Workers	0	81	1,041	3,119	8,302	7,238	8,806	5,933	132	34,651	40
pct	0	0	3	9	24	21	25	17	0	100	NAp
10< to ≤20:											
Workers	0	0	0	233	1,847	2,865	4,798	4,516	132	14,392	45
pct	0	0	0	2	13	20	33	31	1	100	NAp
20<:											
Workers	0	0	0	0	0	26	376	1,316	4	1,723	56
pct	0	0	0	0	0	2	22	76	0	100	NAp
Unspecified:											
Workers	89	345	733	1,069	2,182	2,033	2,711	1,918	1,245	12,325	39
pct	1	3	6	9	18	16	22	16	10	100	NAp
Total:											
Workers	765	3,040	7,879	14,725	31,665	28,554	34,441	23,459	1,866	146,395	39
pct	1	2	5	10	22	20	24	16	1	100	NAp

NAp Not applicable.
[1]Excluding job title category of office workers.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E-38.—Coal mining 1986 workforce estimates:[1] experience at job, by sex

Experience at present job, yr	Male		Female		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct
0< to ≤1	25,464	18	677	20	89	13	26,230	18
1< to ≤2	20,426	14	642	19	52	7	21,120	14
2< to ≤3	13,452	9	333	10	38	5	13,824	9
3< to ≤5	21,440	15	607	18	82	12	22,129	15
5< to ≤10	33,676	24	848	25	127	18	34,651	24
10< to ≤20	14,321	10	25	1	46	7	14,392	10
20<	1,715	1	8	0	0	0	1,723	1
Unspecified	11,868	8	188	6	270	38	12,325	8
Total	142,363	100	3,328	100	704	100	146,395	100
Median.....yr	4	NAp	3	NAp	5	NAp	4	NAp

NAp Not applicable.
[1]Excluding job title category of office workers.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E-39.—Coal mining 1986 workforce estimates:[1] experience at job, by race

Experience at present job, yr	White		Black		Hispanic		Other		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
0< to ≤1	24,814	18	750	21	188	20	335	11	144	8	26,230	18
1< to ≤2	19,659	14	713	20	154	17	474	16	121	7	21,120	14
2< to ≤3	13,107	10	226	6	101	11	357	12	34	2	13,824	9
3< to ≤5	21,023	15	518	14	141	15	377	13	70	4	22,129	15
5< to ≤10	31,951	23	1,128	31	266	29	908	31	398	22	34,651	24
10< to ≤20	13,648	10	214	6	60	7	345	12	124	7	14,392	10
20<	1,665	1	0	0	8	1	50	2	0	0	1,723	1
Unspecified	11,253	8	65	2	0	0	86	3	923	51	12,325	8
Total	137,120	100	3,612	100	917	100	2,932	100	1,814	100	146,395	100
Median.....yr	4	NAp	4	NAp	4	NAp	5	NAp	6	NAp	4	NAp

NAp Not applicable.
[1]Excluding job title category of office workers.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E-40.—Coal mining 1986 workforce estimates:[1] experience at job, by education

Experience at present job, yr	Some elementary		Some high school		High school diploma		Vocational diploma		Some college		College degree		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
0< to ≤1	1,397	16	3,601	19	12,566	19	2,357	23	2,549	20	1,326	21	2,434	11	26,230	18
1< to ≤2	760	9	2,404	12	8,906	13	1,677	16	2,076	17	725	11	4,572	21	21,120	14
2< to ≤3	882	10	1,912	10	6,409	10	936	9	1,404	11	841	13	1,440	7	13,824	9
3< to ≤5	1,328	16	3,357	17	11,087	16	1,455	14	2,128	17	1,125	18	1,648	8	22,129	15
5< to ≤10	2,175	26	4,573	24	17,866	27	2,595	25	3,002	24	1,558	24	2,881	13	34,651	24
10< to ≤20	1,444	17	2,501	13	6,904	10	1,007	10	768	6	363	6	1,405	6	14,392	10
20<	209	2	287	1	815	1	112	1	84	1	35	1	181	1	1,723	1
Unspecified	275	3	744	4	2,862	4	233	2	434	3	445	7	7,332	33	12,325	8
Total	8,470	100	19,380	100	67,413	100	10,372	100	12,446	100	6,419	100	21,894	100	146,395	100
Median.....yr	5	NAp	4	NAp	4	NAp	4	NAp	3	NAp	4	NAp	3	NAp	4	NAp

NAp Not applicable.
[1]Excluding job title category of office workers.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E-41.—Coal mining 1986 workforce estimates:[1] experience at company, by hours of training received in last 2 yr

Experience at present company, yr	0	1–8	9–15	16	17–40	41–80	81–160	161+	Unspecified	Total	Mean, h
0< to ≤1											
Workers	683	1,923	361	1,775	2,593	732	328	77	2,486	10,958	29
pct	6	18	3	16	24	7	3	1	23	100	NAp
1< to ≤5:											
Workers	644	1,122	576	11,350	6,772	3,853	1,934	1,293	8,648	36,193	45
pct	2	3	2	31	19	11	5	4	24	100	NAp
5< to ≤10:											
Workers	1,694	1,573	555	15,775	9,119	4,493	1,796	816	8,224	44,044	35
pct	4	4	1	36	21	10	4	2	19	100	NAp
10< to ≤15:											
Workers	1,002	889	428	11,857	8,547	3,181	1,027	377	6,474	33,783	31
pct	3	3	1	35	25	9	3	1	19	100	NAp
15< to ≤20:											
Workers	145	607	53	4,114	3,227	1,354	286	71	2,451	12,307	30
pct	1	5	0	33	26	11	2	1	20	100	NAp
20< to ≤25:											
Workers	52	123	73	1,114	423	224	61	0	548	2,618	24
pct	2	5	3	43	16	9	2	0	21	100	NAp
25< to ≤30:											
Workers	34	8	38	285	239	122	6	0	369	1,102	28
pct	3	1	3	26	22	11	1	0	33	100	NAp
30<											
Workers	55	174	9	1,205	367	256	73	8	647	2,795	26
pct	2	6	0	43	13	9	3	0	23	100	NAp
Unspecified:											
Workers	15	12	0	263	16	0	152	31	2,106	2,595	76
pct	1	0	0	10	1	0	6	1	81	100	NAp
Total:											
Workers	4,324	6,432	2,092	47,738	31,303	14,216	5,662	2,673	31,953	146,395	35
pct	3	4	1	33	21	10	4	2	22	100	NAp

NAp Not applicable.
[1]Excluding job title category of office workers.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E-42.—Coal mining 1986 workforce estimates:[1] experience at company, by years of age

Experience at present company, yr	15–20	21–23	24–26	27–29	30–34	35–39	40–49	50 +	Unspecified	Total	Mean, yr
0< to ≤1:											
Workers	443	947	1,392	1,244	2,015	1,881	1,951	535	550	10,958	33
pct	4	9	13	11	18	17	18	5	5	100	NAp
1< to ≤5:											
Workers	302	1,933	3,973	5,255	8,293	6,418	6,316	3,204	498	36,193	35
pct	1	5	11	15	23	18	17	9	1	100	NAp
5< to ≤10:											
Workers	0	85	2,362	6,861	11,396	8,963	9,716	4,636	24	44,044	37
pct	0	0	5	16	26	20	22	11	0	100	NAp
10< to ≤15:											
Workers	0	0	0	1,154	9,299	8,460	9,240	5,620	10	33,783	40
pct	0	0	0	3	28	25	27	17	0	100	NAp
15< to ≤20:											
Workers	0	0	0	0	304	2,520	5,338	4,095	51	12,307	46
pct	0	0	0	0	2	20	43	33	0	100	NAp
20< to ≤25:											
Workers	0	0	0	0	0	30	1,095	1,491	2	2,618	51
pct	0	0	0	0	0	1	42	57	0	100	NAp
25< to ≤30:											
Workers	0	0	0	0	0	0	289	812	1	1,102	54
pct	0	0	0	0	0	0	26	74	0	100	NAp
30<											
Workers	0	0	0	0	0	0	24	2,772	0	2,795	59
pct	0	0	0	0	0	0	1	99	0	100	NAp
Unspecified:											
Workers	20	75	151	211	357	282	473	294	731	2,595	38
pct	1	3	6	8	14	11	18	11	28	100	NAp
Total:											
Workers	765	3,040	7,879	14,725	31,665	28,554	34,441	23,459	1,866	146,395	39
pct	1	2	5	10	22	20	24	16	1	100	NAp

NAp Not applicable.
[1]Excluding job title category of office workers.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E-43.—Coal mining 1986 workforce estimates:[1] experience at company, by sex

Experience at present company, yr	Male		Female		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct
0< to ≤1	10,604	7	223	7	130	19	10,958	7
1< to ≤5	34,839	24	1,107	33	247	35	36,193	25
5< to ≤10	42,078	30	1,826	55	140	20	44,044	30
10< to ≤15	33,589	24	111	3	83	12	33,783	23
15< to ≤20	12,277	9	0	0	30	4	12,307	8
20< to ≤25	2,587	2	0	0	31	4	2,618	2
25< to ≤30	1,084	1	4	0	15	2	1,102	1
30<	2,783	2	4	0	8	1	2,795	2
Unspecified	2,523	2	52	2	20	3	2,595	2
Total	142,363	100	3,328	100	704	100	146,395	100
Median, yr	8	NAp	6	NAp	5	NAp	8	NAp

NAp Not applicable.
[1]Excluding job title category of office workers.

NOTE —Owing to independent rounding, data may not add to totals shown.

TABLE E-44.—Coal mining 1986 workforce estimates:[1] experience at company, by race

Experience at present company, yr	White		Black		Hispanic		Other		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
0< to ≤1	10,279	7	43	1	39	4	220	8	377	21	10,958	7
1< to ≤5	34,020	25	578	16	378	41	755	26	461	25	36,193	25
5< to ≤10	40,687	30	1,499	42	322	35	1,149	39	387	21	44,044	30
10< to ≤15	31,652	23	1,085	30	155	17	584	20	307	17	33,783	23
15< to ≤20	11,886	9	226	6	14	2	134	5	47	3	12,307	8
20< to ≤25	2,440	2	72	2	0	0	75	3	31	2	2,618	2
25< to ≤30	1,087	1	0	0	0	0	0	0	15	1	1,102	1
30<	2,677	2	102	3	9	1	0	0	8	0	2,795	2
Unspecified	2,392	2	8	0	0	0	15	1	181	10	2,595	2
Total	137,120	100	3,612	100	917	100	2,932	100	1,814	100	146,395	100
Median, yr	8	NAp	9	NAp	7	NAp	8	NAp	5	NAp	8	NAp

NAp Not applicable.
[1]Excluding job title category of office workers.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E-45.—Coal mining 1986 workforce estimates:[1] experience at company, by education

Experience at present company, yr	Some elementary		Some high school		High school diploma		Vocational diploma		Some college		College degree		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
0< to ≤1	792	9	1,769	9	4,509	7	1,176	11	778	6	516	8	1,418	6	10,958	7
1< to ≤5	1,501	18	4,721	24	16,153	24	2,976	29	3,675	30	2,188	34	4,979	23	36,193	25
5< to ≤10	1,895	22	4,871	25	21,228	31	3,279	32	5,003	40	2,325	36	5,443	25	44,044	30
10< to ≤15	2,165	26	4,444	23	17,112	25	2,418	23	2,242	18	1,150	18	4,252	19	33,783	23
15< to ≤20	1,256	15	2,158	11	5,528	8	327	3	481	4	122	2	2,436	11	12,307	8
20< to ≤25	313	4	376	2	1,045	2	89	1	75	1	18	0	703	3	2,618	2
25< to ≤30	121	1	120	1	456	1	58	1	25	0	8	0	314	1	1,102	1
30<	375	4	687	4	800	1	34	0	147	1	64	1	687	3	2,795	2
Unspecified	52	1	234	1	583	1	15	0	21	0	27	0	1,663	8	2,595	2
Total	8,470	100	19,380	100	67,413	100	10,372	100	12,446	100	6,419	100	21,894	100	146,395	100
Median, yr	11	NAp	9	NAp	8	NAp	7	NAp	7	NAp	6	NAp	9	NAp	8	NAp

NAp Not applicable.
[1]Excluding job title category of office workers.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E-46.—Coal mining 1986 workforce estimates:[1] age, by education

Age, yr	Some elementary		Some high school		High school diploma		Vocational diploma		Some college		College degree		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
15-20	10	1	144	19	404	53	53	7	29	4	0	0	125	16	765	100
21-23	100	3	358	12	1,746	57	220	7	221	7	114	4	282	9	3,040	100
24-26	63	1	994	13	3,847	49	791	10	699	9	436	6	1,049	13	7,879	100
27-29	363	2	1,535	10	7,332	50	1,223	8	1,556	11	873	6	1,843	13	14,725	100
30-34	670	2	2,897	9	16,208	51	2,631	8	3,293	10	1,801	6	4,164	13	31,665	100
35-39	876	3	2,952	10	13,201	46	2,410	8	3,304	12	1,810	6	4,001	14	28,554	100
40-49	2,647	8	5,355	16	15,810	46	1,962	6	2,377	7	987	3	5,303	15	34,441	100
50 +	3,555	15	5,041	21	8,493	36	1,036	4	947	4	367	2	4,021	17	23,459	100
Unspecified	185	10	104	6	372	20	46	2	21	1	30	2	1,108	59	1,866	100
Total	8,470	6	19,380	13	67,413	46	10,372	7	12,446	9	6,419	4	21,894	15	146,395	100
Mean age, yr	47	NAp	41	NAp	38	NAp	36	NAp	36	NAp	35	NAp	40	NAp	39	NAp

NAp Not applicable.
[1]Excluding job title category of office workers.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E-47.—Coal mining 1986 workforce estimates:[1] age, race, and education, by sex

	Male		Female		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Age, yr:								
15–20	750	1	15	0	0	0	765	1
21–23	2,996	2	45	1	0	0	3,040	2
24–26	7,685	5	149	4	45	6	7,879	5
27–29	14,320	10	368	11	38	5	14,725	10
30–34	30,822	22	753	23	89	13	31,665	22
35–39	27,787	20	727	22	40	6	28,554	20
40–49	33,591	24	754	23	96	14	34,441	24
50+	22,920	16	397	12	142	20	23,459	16
Unspecified	1,493	1	119	4	254	36	1,866	1
Total	142,363	100	3,328	100	704	100	146,395	100
Mean age.....yr....	39	NAp	38	NAp	42	NAp	39	NAp
Race:								
White	134,259	94	2,765	83	97	14	137,120	94
Black	3,243	2	361	11	8	1	3,612	2
Hispanic	867	1	51	2	0	0	917	1
Other	2,872	2	44	1	15	2	2,932	2
Unspecified	1,122	1	107	3	585	83	1,814	1
Total	142,363	100	3,328	100	704	100	146,395	100
Education level:								
Some elementary....	8,426	6	29	1	15	2	8,470	6
Some high school ...	18,986	13	356	11	38	5	19,380	13
High school diploma	65,731	46	1,574	47	109	15	67,413	46
Vocational diploma..	10,178	7	186	6	8	1	10,372	7
Some college	11,771	8	648	19	28	4	12,446	9
College degree	6,163	4	218	7	38	5	6,419	4
Unspecified	21,108	15	317	10	469	67	21,894	15
Total	142,363	100	3,328	100	704	100	146,395	100

NAp Not applicable.
[1]Excluding job title category of office workers.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E–48.—Coal mining 1986 workforce estimates:[1] age, and education, by race

	White		Black		Hispanic		Other		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Age, yr:												
15–20	748	1	0	0	0	0	0	0	18	1	765	1
21–23	2,908	2	7	0	34	4	52	2	40	2	3,040	2
24–26	7,582	6	57	2	40	4	146	5	55	3	7,879	5
27–29	13,792	10	381	11	110	12	370	13	72	4	14,725	10
30–34	29,680	22	972	27	211	23	633	22	170	9	31,665	22
35–39	27,071	20	552	15	174	19	599	20	159	9	28,554	20
40–49	32,082	23	1,049	29	191	21	696	24	422	23	34,441	24
50+	21,917	16	587	16	158	17	433	15	363	20	23,459	16
Unspecified	1,341	1	8	0	0	0	3	0	515	28	1,866	1
Total	137,120	100	3,612	100	917	100	2,932	100	1,814	100	146,395	100
Mean age.....yr....	39	NAp	39	NAp	38	NAp	38	NAp	42	NAp	39	NAp
Education level:												
Some elementary....	7,935	6	109	3	44	5	366	12	15	1	8,470	6
Some high school...	18,326	13	440	12	104	11	394	13	115	6	19,380	13
High school diploma	63,957	47	1,634	45	531	58	1,031	35	260	14	67,413	46
Vocational diploma..	9,578	7	171	5	44	5	509	17	71	4	10,372	7
Some college.....	11,314	8	544	15	157	17	360	12	71	4	12,446	9
College degree	6,225	5	108	3	12	1	66	2	8	0	6,419	4
Unspecified.....	19,784	14	605	17	25	3	206	7	1,275	70	21,894	15
Total.....	137,120	100	3,612	100	917	100	2,932	100	1,814	100	146,395	100

NAp Not applicable.
[1]Excluding job title category of office workers.

NOTE.—Owing to independent rounding, data may not add to totals shown.

TABLE E–49.—Coal mining 1986 workforce estimates: number of workers and coefficient of variation— employment size class, by type of coal mined

Employment size class[1]	Anthracite		Bituminous		All	
	Workers	CV, pct	Workers	CV, pct	Workers	CV, pct
1–19	1,016	4.2	16,999	4.0	18,016	3.7
20–49	882	12.2	21,495	4.4	22,377	4.3
50–99	300	1.7	14,473	8.2	14,773	8.0
100–249	380	2.0	34,248	2.6	34,628	2.6
250–499	0	.0	41,935	.2	41,935	.2
500+	0	.0	20,009	.5	20,009	.5
All groupings	2,578	4.7	149,158	1.1	151,737	1.0

[1]MSHA size groups are based on the annual average employment of the primary subunit and not on the total employment; hence, MSHA published injury statistics by size groups should not be analyzed against these data.

NOTE.—Owing to independent rounding, the data for individual entries on number of workers may not equal total shown.

TABLE E-50.—Coal mining 1986 workforce estimates: number of workers and coefficient of variation— job title, by type of coal mined

Job title grouping[1]	Anthracite		Bituminous		All	
	Workers	CV, pct	Workers	CV, pct	Workers	CV, pct
Backhoe-crane-dragline-shovel operator	188	19.2	2,825	8.4	3,013	7.7
Beltman-belt cleaner-belt repairman	7	40.0	5,214	5.0	5,221	5.1
Blaster	9	56.8	1,209	12.1	1,218	11.8
Continuous miner and related machine operator	4	65.5	6,433	3.7	6,437	3.7
Deckhand-barge and dredge operator	3	100.0	232	23.3	235	23.0
Dozer-heavy and mobile equipment operator	101	8.2	10,480	4.9	10,580	4.9
Driller-auger operator	110	13.2	2,762	10.2	2,872	10.0
Electrician-wireman-lampman	50	22.7	6,155	6.0	6,205	5.9
Front-end loader operator	132	13.9	4,192	7.3	4,324	6.9
Grader-scraper operator	12	52.1	2,446	8.0	2,459	7.8
Laborer-miner-utility man	620	8.0	22,647	1.2	23,267	1.2
Longwall operator	0	.0	1,036	9.9	1,036	9.9
Manager-foreman-supervisor:						
General	187	8.7	9,214	3.3	9,400	3.3
Maintenance	2	100.0	2,250	3.5	2,252	3.5
Working	6	42.9	5,515	4.0	5,521	4.0
Mechanic-welder-oiler-machinist	503	8.8	22,735	2.9	23,237	2.7
Mine technical support	90	14.0	6,707	4.4	6,797	4.4
Office worker	81	16.0	5,261	3.8	5,342	3.7
Plant operator-warehouseman	160	8.6	5,735	8.7	5,895	8.4
Roof bolter-rock driller	0	.0	8,206	5.8	8,206	5.8
Scoop tractor operator-motorman	15	27.9	5,261	7.0	5,277	7.0
Shuttle car operator	0	.0	5,646	7.6	5,646	7.6
Truck driver	301	17.3	6,997	4.4	7,297	4.6
All groupings	2,578	4.7	149,158	1.1	151,737	1.0

[1]As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE.—Owing to independent rounding, the data for individual entries on number of workers may not equal total shown.

TABLE E-51.—Coal mining 1986 workforce estimates:[1] number of workers and coefficient of variation— principal equipment operated, by type of coal mined

Equipment operated grouping[2]	Anthracite		Bituminous		All	
	Workers	CV, pct	Workers	CV, pct	Workers	CV, pct
Backhoe-crane-dragline-shovel	181	18.5	2,887	8.2	3,067	7.7
Belt	10	24.5	5,299	5.0	5,308	5.0
Continuous miner and related machinery	4	65.5	6,222	4.5	6,226	4.5
Dozer-heavy and mobile equipment	103	7.1	9,638	5.1	9,741	5.0
Explosives	9	56.8	1,209	12.1	1,218	11.8
Front-end loader-forklift	167	12.3	5,216	7.0	5,383	6.7
Grader-scraper	12	52.1	2,868	6.4	2,881	6.2
Handtools (powered and nonpowered)	390	16.2	25,633	3.0	26,023	2.9
Hoist	41	10.8	443	26.6	484	24.2
Locomotive-mine car	19	22.6	3,997	6.0	4,016	5.9
Longwalls and parts	0	.0	945	4.4	945	4.4
Many equipment	29	43.1	2,859	4.1	2,888	4.3
Miscellaneous utility equipment	490	10.9	12,810	2.2	13,300	2.1
Plant equipment	136	13.6	4,108	7.8	4,245	7.8
Rock dusting machine-pump	2	100.0	1,132	9.9	1,134	9.8
Roof bolting machine-underground drill	23	36.9	8,844	5.3	8,868	5.2
Scale-lab equipment-controls	26	37.6	2,182	6.0	2,208	6.0
Scoop	0	.0	3,853	8.0	3,853	8.0
Shuttle car	0	.0	5,703	7.4	5,703	7.4
Surface drill-auger	92	11.2	2,055	11.3	2,147	11.0
Truck (haulage)	310	16.1	7,311	4.6	7,621	4.8
Truck (utility)-personnel carrier	6	50.3	2,487	9.6	2,494	9.6
Welding machine-lathe	225	10.3	4,284	4.0	4,509	3.7
None	207	10.3	21,735	2.9	21,942	2.9
Unspecified-not elsewhere classified	14	44.3	178	36.8	192	34.7
All groupings	2,498	4.6	143,897	1.1	146,395	1.0

[1]Excluding job title category of office workers.
[2]See appendix B for detailed explanation of equipment operated grouping.

NOTE.—Owing to independent rounding, the data for individual entries on number of workers may not equal total shown.

TABLE E-52.—Coal mining 1986 workforce estimates: number of workers and coefficient of variation— work location at mine, by type of coal mined

Work location	Anthracite		Bituminous		All	
	Workers	CV, pct	Workers	CV, pct	Workers	CV, pct
Underground mine	392	7.7	69,471	1.4	69,863	1.4
Surface at underground mine	121	15.2	8,757	4.1	8,878	4.1
Surface mine	1,229	5.4	51,061	2.0	52,291	1.9
Plant or mill	730	8.2	12,222	5.9	12,952	5.5
Office	107	14.9	7,647	2.4	7,753	2.4
All groupings	2,578	4.7	149,158	1.1	151,737	1.0

NOTE.—Owing to independent rounding, the data for individual entries on number of workers may not equal total shown.

TABLE E-53.—Coal mining 1986 workforce estimates:[1] number of workers and coefficient of variation— experience at job, company, and mining, by type of coal mined

Experience, yr	Anthracite		Bituminous		All	
	Workers	CV, pct	Workers	CV, pct	Workers	CV, pct
At present job:						
0< to ≤1	219	17.5	26,011	3.6	26,230	3.5
1< to ≤2	243	12.7	20,877	3.9	21,120	3.8
2< to ≤3	117	17.9	13,707	4.8	13,824	4.8
3< to ≤5	218	16.4	21,911	4.3	22,129	4.3
5< to ≤10	439	9.7	34,212	1.3	34,651	1.4
10< to ≤20	345	13.3	14,047	4.1	14,392	4.2
20<	136	17.0	1,587	8.8	1,723	8.1
Unspecified	781	10.0	11,545	10.2	12,325	9.7
All groupings	2,498	4.6	143,897	1.1	146,395	1.0
At present company:						
0< to ≤1	311	14.7	10,647	8.5	10,958	8.5
1< to ≤5	725	7.5	35,467	2.8	36,193	2.8
5< to ≤10	488	8.4	43,556	1.8	44,044	1.8
10< to ≤15	630	12.7	33,153	2.1	33,783	2.2
15< to ≤20	177	13.9	12,129	6.3	12,307	6.1
20< to ≤25	93	22.8	2,525	8.6	2,618	8.6
25< to ≤30	28	25.8	1,074	15.8	1,102	15.7
30<	35	38.2	2,760	7.1	2,795	6.9
Unspecified	9	64.0	2,586	21.8	2,595	21.8
All groupings	2,498	4.6	143,897	1.1	146,395	1.0
Total mining:						
0< to ≤1	89	15.9	3,341	11.4	3,430	11.1
1< to ≤5	299	9.8	16,591	7.4	16,890	7.2
5< to ≤10	291	14.5	38,623	2.4	38,914	2.3
10< to ≤15	287	11.3	33,668	2.0	33,955	2.0
15< to ≤20	114	14.6	14,152	5.0	14,266	5.0
20< to ≤25	85	32.9	4,524	4.5	4,610	4.6
25< to ≤30	88	28.5	2,168	6.8	2,257	6.6
30<	66	22.8	4,335	6.2	4,401	6.0
Unspecified	1,179	13.2	26,494	7.8	27,673	7.3
All groupings	2,498	4.6	143,897	1.1	146,395	1.0

[1]Excluding job title category of office workers.

NOTE.—Owing to independent rounding, the data for individual entries on number of workers may not equal total shown.

TABLE E-54.—Coal mining 1986 workforce estimates:[1] number of workers and coefficient of variation— training received, by type of coal mined

Job training for last 2 yr, h	Anthracite		Bituminous		All	
	Workers	CV, pct	Workers	CV, pct	Workers	CV, pct
0	167	30.3	4,157	13.1	4,324	12.4
1–8	104	21.8	6,328	8.6	6,432	8.3
9–15	12	21.8	2,080	13.0	2,092	12.9
16	963	12.5	46,775	3.0	47,738	2.9
17–40	117	26.1	31,186	5.0	31,303	5.0
41–80	114	28.3	14,102	3.0	14,216	2.9
81–160	17	57.4	5,645	7.5	5,662	7.5
161+	6	100.0	2,667	3.5	2,673	3.4
Unspecified	997	11.4	30,956	5.0	31,953	4.7
All groupings	2,498	4.6	143,897	1.1	146,395	1.0

[1]Excluding job title category of office workers.

NOTE.—Owing to independent rounding, the data for individual entries on number of workers may not equal total shown.

TABLE E-55.—Coal mining 1986 workforce estimates:[1] number of workers and coefficient of variation— age, by type of coal mined

Age, yr	Anthracite		Bituminous		All	
	Workers	CV, pct	Workers	CV, pct	Workers	CV, pct
15–20	30	23.4	735	10.4	765	10.0
21–23	94	10.5	2,946	11.0	3,040	10.8
24–26	130	17.8	7,750	6.1	7,879	5.9
27–29	184	9.4	14,541	3.2	14,725	3.1
30–34	378	10.1	31,287	2.2	31,665	2.2
35–39	332	7.4	28,222	3.2	28,554	3.2
40–49	471	10.2	33,971	2.1	34,441	2.0
50+	777	7.6	22,682	2.3	23,459	2.4
Unspecified	103	35.4	1,763	23.6	1,866	22.5
All groupings	2,498	4.6	143,897	1.1	146,395	1.0

[1]Excluding job title category of office workers.

NOTE.—Owing to independent rounding, the data for individual entries on number of workers may not equal total shown.

TABLE E–56.—Coal mining 1986 workforce estimates:[1] number of workers and coefficient of variation— sex, race, and education, by type of coal mined

	Anthracite		Bituminous		All	
	Workers	CV, pct	Workers	CV, pct	Workers	CV, pct
Sex:						
Male	2,487	4.6	139,876	1.0	142,363	1.0
Female	10	56.3	3,317	8.1	3,328	8.0
Unspecified	0	.0	704	17.8	704	17.8
All groupings	2,498	4.6	143,897	1.1	146,395	1.0
Race:						
White	2,480	4.7	134,640	1.2	137,120	1.2
Black	6	79.1	3,606	4.5	3,612	4.5
Hispanic	5	100.0	912	15.2	917	15.0
Other	5	100.0	2,927	10.6	2,932	10.6
Unspecified	1	100.0	1,812	25.1	1,814	25.2
All groupings	2,498	4.6	143,897	1.1	146,395	1.0
Education level:						
Some elementary	61	25.1	8,409	5.7	8,470	5.7
Some high school	173	16.5	19,207	3.2	19,380	3.2
High school diploma	1,148	10.5	66,266	.9	67,413	.9
Vocational diploma	151	31.4	10,221	5.4	10,372	5.3
Some college	35	26.7	12,411	3.2	12,446	3.2
College degree	52	23.2	6,367	5.3	6,419	5.3
Unspecified	877	9.1	21,017	6.6	21,894	6.2
All groupings	2,498	4.6	143,897	1.1	146,395	1.0

[1]Excluding job title category of office workers.

NOTE.—Owing to independent rounding, the data for individual entries on number of workers may not equal total shown.

APPENDIX F.—MINING INDUSTRY POPULATION SURVEY LETTERS AND QUESTIONNAIRE

United States Department of the Interior

BUREAU OF MINES
2401 E STREET, NW.
WASHINGTON, D.C. 20241

Dear Mine Manager:

The Bureau of Mines, U.S. Department of the Interior, is requesting your help in conducting a survey of the mining industry. The survey is designed to characterize the nation's mine-worker population by occupation, job experience, training, age, and other factors. These data are necessary to accurately analyze the nation's mine accidents. At this time, the information sought by this survey cannot be obtained from any other source.

Your firm was randomly selected to represent firms of a similar size in your industry. Although your response to this survey is voluntary, the validity of the results depends upon a very high response rate. We urge you, therefore, to respond as completely and accurately as possible based upon information from your personnel files, management records, or direct response from individual workers at your mine.

Under no circumstances will the information you provide be identified by individual mine, company, or worker. The data will be used for statistical purposes only and the results of the survey when analyzed with accident statistics will be made available to the public in the form of official publications.

Instructions for completing the survey questionnaire are on the enclosed survey form. Questions regarding the survey should be directed to:

Ms. Shail Butani
Bureau of Mines
5629 Minnehaha Avenue South
Minneapolis, MN 55417
Telephone: (612) 725-4500

(Note: Collect calls regarding this survey will be accepted during regular business hours, 8:00 a.m. to 4:00 p.m., Central Time.)

Thank you for your time and effort.

Sincerely,

Robert C. Horton

Director

Enclosure