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**Industry
Wage Survey**
Metal Mining
September 1972

Bulletin 1820

U.S. DEPARTMENT OF LABOR
Bureau of Labor Statistics
1974

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**Industry
Wage Survey**

**Metal Mining
September 1972**

**Part I. Iron Ore
Mining**

**Part II. Copper Ore
Mining**

**Part III. Lead and Zinc
Ore Mining**

Bulletin 1820

**U.S. DEPARTMENT OF LABOR
Peter J. Brennan, Secretary**

**BUREAU OF LABOR STATISTICS
Julius Shiskin, Commissioner
1974**



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Preface

This three-part bulletin summarizes the results of a Bureau of Labor Statistics survey of wages and supplementary benefits in three metal mining industries in September 1972. Information is provided separately for: Iron ore mining (Part I); copper ore mining (Part II); and lead and zinc ore mining (Part III).

A summary tabulation, providing national information, was issued in January 1974. Copies of this release are available from the Bureau of Labor Statistics, Washington, D.C. 20212, or any of its regional offices.

This study was conducted in the Bureau's Office of Wages and Industrial Relations. Carl Barsky of the Division of Occupational Wage Structures prepared the analysis in this bulletin. Field work for the survey was conducted by the Bureau's regional offices.

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Part I. Iron ore mining

Summary

Straight-time earnings of production and related workers in iron ore mining averaged \$4.41 an hour in September 1972. Nine-tenths of the 13,128 workers covered by the survey¹ earned between \$3.50 and \$5; the middle half fell between \$3.97 and \$4.84.

Among occupations selected for separate study, average hourly earnings ranged from \$5.42 for miners to \$3.52 for surface laborers.² Maintenance mechanics, the largest occupational group studied separately, averaged \$4.83 an hour.

Paid holidays, paid vacations, and employer contributions to various health, insurance, and retirement plans were provided virtually all production and related workers in the survey. With few exceptions, workers received 9 paid holidays annually and 1 week of vacation pay after 1 year of service, 2 weeks after 3 years, 3 weeks after 10 years, and 4 weeks after 25 years.

Industry characteristics

Iron ore mining and treatment facilities covered by the survey employed 13,128 production and related workers (virtually all men) in September 1972. At that time, the Bureau's employment and earning series reported production worker employment in the iron ore mining industry at 54 percent below its peak in August 1957.

The domestic production of usable iron ore declined less sharply than employment during the same 15-year period—down 29 percent to 75.4 million long tons in 1972. This disparity between employment and production decline reflected a 50 percent increase in productivity for the industry, as measured by output per production worker man-hour.³ Contributing to productivity gains were the use of high capacity shovels and haulage equipment, increased automation of ore treatment facilities, including monitoring by electronic panelboard, and the increased production of iron ore pellets.

Facilities. Nine-tenths of the production workers surveyed in September 1972 were employed in establishments⁴ that included ore treatment operations; four-fifths were employed by establishments that also had agglomerating facilities, i.e., equipment that prepares the product into a form suitable for the blast furnace.

Surface mines and related facilities employed 9,717 production workers, four-fifths of whom were in establishments using trucks as the primary method of ore haulage from working place to primary crusher. The remainder used rail as the primary method. Rail was also the primary means of haulage from mine face to hoist or exit in establishments employing two-fifths of the 3,411 workers associated with underground mining operations.

Size of establishment. Three-fourths of the production workers were employed in establishments with 500 employees or more. Those with 100 to 249 workers accounted for slightly more than one-tenth of the production workers, and a similar proportion was in the 250-499 category. Most of the establishments studied were part of large, multi-plant companies.

Location. Iron ore workers in scope of the study were employed in only a few States, primarily in the Great Lakes and Middle West regions. Four-fifths of the workers were employed in Michigan and Minnesota. Missouri, the third largest State in industry employment, had slightly less than one-tenth of the production workers.

Unionization. Contracts with the United Steelworkers of America (AFL-CIO) covered virtually all of the production and related workers in the survey.

¹ See appendix A for scope and method of survey. Earnings data exclude premium pay for overtime and for work on weekends, holidays, and late shifts.

² For job descriptions, see appendix B.

³ "Iron Ore in December 1973," *Mineral Industry Surveys*, February 25, 1974 (Bureau of Mines), p. 2; *Indexes of Output Per Man-Hour: Selected Industries*, Bulletin 1780 (Bureau of Labor Statistics, 1973), pp. 9-10.

⁴ For establishment definition, see appendix A.

Method of wage payment. Time rates, typically paid on a single-rate basis for specified occupations, applied to nearly all of the production workers in September 1972. Only one occupation—miners—had a substantial proportion of workers (two-thirds) paid under incentive plans, usually production bonuses.

Average hourly earnings

Straight-time hourly earnings of the 13,128 production workers in iron ore mining averaged \$4.41 in September 1972 (table 1).⁵ Nine-tenths earned between \$3.50 and \$5; the middle half fell between \$3.97 and \$4.84.

Earnings in the iron ore industry were rather compressed in comparison to other industries surveyed by the Bureau in the last decade. The index of wage dispersion for iron mining, measured by dividing the middle range of earnings by the median, was 20 percent. Only four industries showed lower dispersion factors.⁶

Occupational earnings

Occupations selected to represent various skill levels and the wage structure of the industry accounted for seven-tenths of the production and related workers (table 2). Average hourly earnings ranged from \$5.42 for miners to \$3.52 for surface laborers. Maintenance mechanics, the largest group studied separately, averaged \$4.83 an hour.

Among occupations directly related to mining, averages varied considerably. Miners, whose duties include drilling and charging holes with explosives, recorded the highest average (\$5.42) and were the most populous underground occupation. Change room attendants, whose responsibilities might involve observing boilers and making minor adjustments in addition to maintaining cleanliness of change rooms and supplying materials, averaged the lowest (\$3.54) in mining operations.

For survey jobs classified under ore treatment operations, averages were between \$4.52 an hour (concentrator and pellet-mill operators) and \$4.10 (secondary crusher operators). All these occupations involved operation and adjustment or regulation of ore treatment machinery and equipment.

Workers in six selected maintenance crafts had averages ranging from \$5.01 for electricians and machinists to \$4.80 for heavy duty mechanics. Other maintenance trades and averages were automotive mechanics, \$4.83; maintenance mechanics, \$4.83; and welders, \$4.82. Four-fifths of the 3,523 workers in these six trades earned between \$4.80 and \$5.

Wages appeared to be compressed in other job categories as well. Among the 36 jobs studied separately, 23 showed distributions with nine-tenths or more of the incumbents receiving rates within 40-cent intervals. For 30 of the 36 survey jobs, earnings for at least one-half of the workers were in 20-cent ranges. Only miners, who were frequently paid incentive bonuses, had as much as a \$1.40 range between the highest and lowest paid worker compared to 80 cents for most other jobs. Single-rate wage plans, which covered nearly nine-tenths of the workers in the industry, contributed heavily to the compression of wages. Other factors included the high percentage of workers organized by a single union, and the concentration of the work force in relatively few large, multiplant companies and in one section of the country—the North Central region.

Establishment practices and supplementary wage benefits

Data were also obtained on certain establishment practices and supplementary wage benefits for production workers, including work schedules, shift differentials, paid holidays, paid vacations, and specified health, insurance, and retirement plans.

Work schedules. Ninety-four percent of the production employees were in establishments where work schedules of 5 days and 40 hours a week were predominant (table 3). The remainder were on a 6-day, 48-hour workweek.

⁵ Straight-time hourly earnings in this bulletin exclude premium pay for overtime and for work on weekends, holidays, and late shifts. Average earnings were calculated by summing individual hourly earnings and dividing by the number of individuals. They differ from gross average hourly earnings in the Bureau's monthly series (\$4.50 in September 1972) in which the sum of man-hour totals reported by establishments in the industry was divided into the reported payrolls.

The estimate of production workers within scope of the study is intended only as a general guide to the size and composition of the labor force included in the survey. It differs from the monthly series (17,000) in September 1972 because (1) establishments employing fewer than 50 workers were excluded as were auxiliary units and (2) the list of establishments was assembled considerably in advance of data collection. Thus, new establishments are omitted as are those that are no longer operating or out of scope at the time of the survey.

⁶ Comparisons of wage dispersion factors were made between the iron ore industry and others surveyed by the Bureau in the last decade, for which nationwide earnings distributions of all production (nonsupervisory) workers were available. The industries showing lower dispersions were motor vehicles, April 1969 (6 percent); bituminous coal mining, January 1967 (13 percent); petroleum refining, April 1971 (14 percent); and copper ore mining, September 1972 (15 percent). (See Part II of this bulletin).

Shift provisions and practices. All production workers were in establishments with late-shift provisions under which differentials were paid (table 4). About one-fourth of the workers, however, were actually employed on second shifts in September 1972, and slightly less than one-fifth on third or other late shifts. Shift differentials, granted in uniform cents per hour above day-shift rates, were nearly always 10 cents for second shifts and 15 cents for third shifts.

Paid holidays. Nine paid holidays were granted annually to nearly all workers covered by the survey (table 5). According to collective bargaining agreements in effect at that time, the nine were: New Year's Day, Good Friday, Memorial Day, the Fourth of July, Labor Day, Thanksgiving, the day after Thanksgiving, Christmas Eve, and Christmas Day.

Paid vacations. The following vacation provisions applied after qualifying periods of service to virtually all production workers: 1 week of vacation pay after 1 year of service, 2 weeks after 3 years, 3 weeks after 10 years, and 4 weeks after 25 years (table 6).

Extended vacation plans, providing additional pay every five years, covered more than 95 percent of the workers (table 8). Typically, under extended vacation plans, the "Senior Group" of employees (one-half of employees with longest continuous service) are granted additional vacation pay to bring their total for the year to 13 weeks. The "Junior Group" of employees receive an additional 3 weeks' vacation pay.

Health, insurance, and retirement plans. Life, sickness and accident, hospitalization, surgical, basic and major medical insurance, and retirement pension plans were provided to all or nearly all of the workers (table 7). Slightly more than one-eighth of the workers also were covered by accidental death and dismemberment insurance. All insurance and retirement plans were financed entirely by the employer.

Other selected benefits. Virtually all workers were in establishments with provisions for technological severance pay, supplemental unemployment benefits, and periodic cost-of-living adjustments.⁷

⁷ For definition of these items, see appendix A.

Table 1. Iron ore mining: Earnings distribution

(Percent distribution of production workers by average straight-time hourly earnings and method of wage payment, United States, September 1972)

Hourly earnings ¹	All workers	Time-workers	Incentive workers	Hourly earnings ¹	All workers	Time-workers	Incentive workers
\$ 3.40 and under \$ 3.50	0.2	0.2	-	\$ 6.00 and under \$ 6.10	.1	-	1.5
\$ 3.50 and under \$ 3.60	9.2	9.6	-	\$ 6.10 and under \$ 6.20	.1	-	2.9
\$ 3.60 and under \$ 3.70	2.1	2.2	-	\$ 6.20 and under \$ 6.30	.2	-	5.1
\$ 3.70 and under \$ 3.80	2.7	2.8	-	\$ 6.30 and under \$ 6.40	.2	-	5.5
\$ 3.80 and under \$ 3.90	8.2	8.6	-	\$ 6.40 and under \$ 6.50	.1	-	1.8
\$ 3.90 and under \$ 4.00	3.4	3.5	-	\$ 6.50 and under \$ 6.60	.1	-	1.8
\$ 4.00 and under \$ 4.10	6.0	6.3	-	\$ 6.60 and under \$ 6.70	.1	-	3.3
\$ 4.10 and under \$ 4.20	6.3	6.6	-	\$ 6.70 and under \$ 6.80	.1	-	1.8
\$ 4.20 and under \$ 4.30	8.1	8.4	-	\$ 6.80 and under \$ 6.90	-	-	-
\$ 4.30 and under \$ 4.40	8.3	8.7	-	\$ 6.90 and under \$ 7.00	.1	-	3.3
\$ 4.40 and under \$ 4.50	2.9	3.0	-	\$ 7.00 and under \$ 7.10	.2	-	3.7
\$ 4.50 and under \$ 4.60	2.6	2.7	-	\$ 7.10 and under \$ 7.20	-	-	-
\$ 4.60 and under \$ 4.70	3.9	3.7	8.8	\$ 7.20 and under \$ 7.30	.1	-	1.5
\$ 4.70 and under \$ 4.80	1.8	1.7	4.8	\$ 7.30 and under \$ 7.40	.1	-	1.8
\$ 4.80 and under \$ 4.90	23.0	23.9	1.5	\$ 7.40 and under \$ 7.50	-	-	-
\$ 4.90 and under \$ 5.00	2.4	2.2	6.6	\$ 7.50 and over	.3	-	7.0
\$ 5.00 and under \$ 5.10	5.6	5.6	6.6				
\$ 5.10 and under \$ 5.20	.1	(²)	1.8				
\$ 5.20 and under \$ 5.30	.3	.2	1.5				
\$ 5.30 and under \$ 5.40	.2	(²)	3.7				
\$ 5.40 and under \$ 5.50	-	-	-				
\$ 5.50 and under \$ 5.60	.1	.1	-				
\$ 5.60 and under \$ 5.70	.4	-	9.6				
\$ 5.70 and under \$ 5.80	.2	-	4.8				
\$ 5.80 and under \$ 5.90	.1	-	2.9				
\$ 5.90 and under \$ 6.00	.3	-	6.3				
				Total	100.0	100.0	100.0
				Number of workers	13, 128	12, 584	544
				Average hourly earnings	\$ 4.41	\$ 4.34	\$ 5.92

¹ Excludes premium pay for overtime and for work on weekends, holidays, and late shifts.

² Less than 0.05 percent.

NOTE: Because of rounding, sums of individual items may not equal 100.

Table 2. Iron ore mining: Occupational earnings

(Number and average straight-time hourly earnings¹ of workers in selected occupations, United States, September 1972)

Occupation	Number of workers	Average hourly earnings	Number of workers receiving straight-time hourly earnings ¹ of—																		
			\$3.40 and under	\$3.60	\$3.80	\$4.00	\$4.20	\$4.40	\$4.60	\$4.80	\$5.00	\$5.20	\$5.40	\$5.60	\$5.80	\$6.00	\$6.20	\$6.40	\$6.60	\$6.80	\$7.00 or more
			\$3.60	\$3.80	\$4.00	\$4.20	\$4.40	\$4.60	\$4.80	\$5.00	\$5.20	\$5.40	\$5.60	\$5.80	\$6.00	\$6.20	\$6.40	\$6.60	\$6.80	\$7.00	or more
Mining operations																					
Brakemen	62	\$4.06	-	2	18	33	9	-	-	-	-	-	-	-	-	-	-	-	-	-	
Bulldozer operators (fine grade)	386	4.23	-	-	-	254	120	-	-	12	-	-	-	-	-	-	-	-	-	-	
Cage tenders	34	4.03	-	-	17	14	3	-	-	-	-	-	-	-	-	-	-	-	-	-	
Change room attendants	141	3.54	135	-	4	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Drillers, machine	133	4.31	-	-	-	5	103	23	-	2	-	-	-	-	-	-	-	-	-	-	
Dumpers	24	4.09	-	-	16	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	
Groundmen	68	3.69	49	-	10	-	6	3	-	-	-	-	-	-	-	-	-	-	-	-	
Laborers, underground	87	3.61	-	87	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Loading-machine operators	132	4.53	-	-	6	11	14	-	101	-	-	-	-	-	-	-	-	-	-	-	
Miners	854	5.42	-	-	-	18	27	72	267	44	46	28	6	78	50	24	58	20	28	18	76
Power-shovel operators	242	4.93	-	-	-	-	-	-	12	224	-	-	-	-	-	-	-	-	-	-	-
Pumpmen	12	3.81	-	2	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shot firers	56	4.25	-	-	-	-	8	48	-	-	-	-	-	-	-	-	-	-	-	-	-
Shuttle-car operators, (electric overhead powered)	136	4.22	-	-	2	33	101	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ore treatment operations																					
Balling-drum operators	69	4.25	-	-	-	38	27	-	-	4	-	-	-	-	-	-	-	-	-	-	-
Concentrator operators	42	4.52	-	-	-	-	16	8	14	4	-	-	-	-	-	-	-	-	-	-	-
Crusher operators	192	4.14	-	-	28	134	24	-	-	6	-	-	-	-	-	-	-	-	-	-	-
Primary crusher	125	4.16	-	-	22	79	18	-	-	6	-	-	-	-	-	-	-	-	-	-	-
Secondary crusher	67	4.10	-	-	6	55	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Filter operators	81	4.12	-	-	24	53	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Flotation operators	18	4.47	-	-	-	6	4	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Furnace operators	111	4.49	-	-	20	7	4	20	56	4	-	-	-	-	-	-	-	-	-	-	-
Pellet-mill operators	45	4.52	-	-	-	-	27	8	-	10	-	-	-	-	-	-	-	-	-	-	-
Rod-and ball-mill operators	83	4.34	-	-	-	26	20	37	-	-	-	-	-	-	-	-	-	-	-	-	-
Mining and ore treatment operations																					
Clean-up equipment operators	116	4.28	-	-	9	43	28	36	-	-	-	-	-	-	-	-	-	-	-	-	-
Conveyor operators	161	3.75	-	129	28	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Electricians, maintenance	496	5.01	-	-	-	-	-	-	12	15	467	-	2	-	-	-	-	-	-	-	-
Helpers, maintenance trades	163	3.89	-	2	161	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hoistmen	50	4.43	-	-	4	-	-	42	4	-	-	-	-	-	-	-	-	-	-	-	-
Laborers, other than underground	1,078	3.52	1,026	48	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Machinists, maintenance	126	5.01	-	-	-	-	-	2	-	-	124	-	-	-	-	-	-	-	-	-	-
Mechanics, automotive	377	4.83	-	-	-	-	-	-	-	377	-	-	-	-	-	-	-	-	-	-	-
Mechanics, heavy duty	329	4.80	-	-	-	-	-	24	-	305	-	-	-	-	-	-	-	-	-	-	-
Mechanics, maintenance	1,452	4.83	-	-	-	-	-	-	8	1,444	-	-	-	-	-	-	-	-	-	-	-
Oilers and greasers	191	3.90	-	10	165	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Steel sharpeners	17	4.07	-	-	7	6	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Truckdrivers ²	1,079	4.30	-	-	-	223	840	4	-	12	-	-	-	-	-	-	-	-	-	-	-
Ore haulage	836	4.36	-	-	-	10	818	4	-	8	-	-	-	-	-	-	-	-	-	-	-
Service or water	235	4.10	-	-	-	209	22	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Welders, maintenance	743	4.82	-	-	-	-	-	18	10	711	-	-	4	-	-	-	-	-	-	-	-

¹ Excludes premium pay for overtime and for work on weekends, holidays, and late shifts.

² Includes data for workers in classification in addition to those shown separately.

Table 3. Iron ore mining: Work schedules

(Percent of production workers in establishments by scheduled weekly hours and days, ¹ United States, September 1972)

Weekly hours and days ¹	Percent
All production workers -----	100
40 hours-5 days -----	94
48 hours-6 days -----	6

¹ Data relate to the predominant work schedule of full-time day-shift workers in each establishment.

Table 4. Iron ore mining: Shift provisions and practices

(Percent of production workers by shift differential provisions ¹ and practices, United States, September 1972)

Shift differential	Percent of production workers--			
	In establishments having formal provisions ¹ for--		Actually working on--	
	Second shifts	Third or other late shifts	Second shifts	Third or other late shifts
Total -----	100.0	100.0	24.0	18.2
With shift differential -----	100.0	100.0	24.0	18.2
Uniform cents per hour -----	100.0	100.0	24.0	18.2
9 cents -----	2.2	-	.3	-
10 cents -----	97.8	-	23.7	-
15 cents -----	-	97.8	-	18.0
18 cents -----	-	2.2	-	.3

¹ Refers to policies of establishments either currently operating late shifts or having provisions covering late shifts.

NOTE: Because of rounding sums of individual items may not equal totals.

Table 5. Iron ore mining: Paid holidays

(Percent of production workers in establishments with formal provisions for paid holidays, United States, September 1972)

Number of paid holidays and holidays provided	Percent
All production workers -----	100
Workers in establishments providing:	
Paid holidays -----	99
8 days -----	1
9 days -----	98
Holidays provided:	
New Year's Day -----	99
Good Friday -----	96
Memorial Day -----	99
Fourth of July -----	99
Labor Day -----	99
Thanksgiving Day -----	99
Day after Thanksgiving -----	97
Christmas Eve -----	99
Christmas Day -----	99
Other--2 days -----	2

Table 6. Iron ore mining: Paid vacations

(Percent of production workers in establishments with formal provisions for paid vacations, United States, September 1972)

Vacation policy	Percent	Vacation policy	Percent
All production workers -----	100	<u>Amount of vacation pay--Continued</u>	
<u>Method of payment</u>		<u>After 3 years of service:</u>	
Workers in establishments providing		2 weeks -----	99
paid vacations ¹ -----	99	<u>After 10 years of service:</u>	
Length-of-time payment -----	97	2 weeks -----	2
Percent payment -----	2	3 weeks -----	97
Workers in establishments providing no		<u>After 15 years of service:</u>	
paid vacation -----	1	3 weeks -----	99
<u>Amount of vacation pay ²</u>		<u>After 20 years of service:</u>	
<u>After 1 year of service:</u>		3 weeks -----	98
1 week -----	99	4 weeks -----	1
		<u>After 25 years of service:³</u>	
		3 weeks -----	2
		4 weeks -----	97

¹ Service payments either during the summer or at the end of the year to workers with specified periods of service were classified as vacation pay regardless of whether workers took time off from work.

² Vacation payments such as percent of annual earnings were converted to an equivalent time basis. Period of service were chosen arbitrarily and do not necessarily reflect individual establishment provisions for progression. For example changes indicated at 15 years may include changes which occurred between 10 and 15 years.

³ Vacation provisions were the same after longer periods of service.

Table 7. Iron ore mining: Health, insurance, and retirement plans

(Percent of production workers in establishments with specified health, insurance and retirement plans, United States, September 1972)

Type of plan ¹	Percent	Type of plan ¹	Percent
All production workers -----	100	Workers in establishments providing—	
Workers in establishments providing:		Continued	
Life insurance -----	100	Hospitalization insurance -----	100
Noncontributory plans -----	100	Noncontributory plans -----	100
Accidental death and dismemberment insurance -----	14	Surgical insurance -----	100
Noncontributory plans -----	14	Noncontributory plans -----	100
Sickness and accident insurance and sick leave or both ² -----	97	Medical insurance -----	100
Sickness and accident insurance -----	97	Noncontributory plans -----	100
Noncontributory plans -----	97	Major medical insurance -----	99
Sick leave (full pay, no waiting period) -----	-	Noncontributory plans -----	99
Sick leave (partial pay or waiting period) -----	-	Retirement plans ³ -----	99
		Pension plans -----	99
		Noncontributory plans -----	99
		Severance pay -----	-

¹ Includes only those plans for which the employer pays at least part of the cost and excludes legally required plans, such as workmen's compensation and social security. However, plans required by State temporary disability laws are included if the employer contributes more than is legally required or the employees receive benefits in excess of the legal requirements. "Noncontributory plans" include only those plans financed entirely by the employer.

² Unduplicated total of workers receiving sick leave or sickness and accident insurance shown separately.

³ Unduplicated total of workers covered by pensions or retirement severance payments shown separately.

Table 8. Iron ore mining: Other selected benefits

(Percent of production workers in establishments providing technological severance pay, supplemental unemployment benefits, extended vacations and cost-of-living adjustments, United States, September 1972)

Item ¹	Percent
All production workers -----	100
Workers in establishments with provision for:	
Technological severance pay -----	96
Supplemental unemployment benefits -----	97
Extended vacations -----	96
Cost-of-living adjustments -----	96
Based on CPI -----	96

¹ For definition of items see appendix A.

Part II. Copper Ore Mining

Summary

Straight-time earnings of the 27,046 production and related workers in copper ore mining averaged \$4.43 an hour in September 1972. All but 7 percent of the workers covered by the survey⁸ had earnings between \$3.50 and \$5 an hour; the middle half ranged from \$4.05 to \$4.73.

Among jobs selected to represent the industry's wage structure, average hourly earnings ranged from \$5.25 for power-shovel operators to \$3.64 for change room attendants.⁹ Truckdrivers, the largest occupational group studied separately, averaged \$4.61 an hour.

Virtually all workers covered by the survey were provided paid holidays, paid vacations, and various health, insurance, and retirement plans. Workers typically received 8 paid holidays annually and 1 week of vacation pay after 1 year of service, 2 weeks after 3 years, 3 weeks after 10 years, and 4 weeks after 20 years.

Industry characteristics

Establishments within scope of the survey employed 27,046 production and related workers in September 1972. These workers, virtually all men, were engaged in mining and ore treatment operations; all smelting activities were excluded.

Employment of production workers, as reported by the Bureau's employment and earnings series, has fluctuated considerably in the last 30 years; it reached its post-World War II peak in 1972. On several occasions between 1942 and 1972 average annual employment rose or fell more than 20 percent in one year. Strikes appear to have been the single most important cause of major employment fluctuations. Other factors, however, have contributed, such as discoveries of new ore deposits, the closing of older mines when only low grade ore remained, and price changes, which make ores with relatively low copper content economically feasible to mine.¹⁰

Despite employment fluctuations, productivity, as measured by production worker output of recoverable metal per man-hour, has risen 2.9 percent annually

since 1947. Production in 1972, 1.64 million short tons, was slightly less than the all-time high reached in 1970.¹¹

Facilities. All establishments studied operated ore treatment facilities for their mines in September 1972. Two-thirds of the workers were employed in establishments that had leaching facilities which chemically break down copper compounds into higher quality ore.

Slightly fewer than three-fifths of the workers were employed in surface mining establishments. One-fourth were in underground operations; and the remainder, in establishments with both types of mines. Among the 6,455 workers in underground establishments, three-fifths were employed by establishments using rail as the primary ore haulage method from working face to hoist or exit. In surface mines the 15,360 workers were divided among establishments that used trucks (45 percent), rail (40 percent), and other means to haul ore from work place to primary crusher.

Size of establishment. Workers in the copper ore mining industry are employed primarily by large, multi-plant companies. Eighty percent of the production workers in September 1972 were found in establishments of 1,000 workers or more, about 40 percent each in establishments of the 1,000-2,499 and the 2,500 or more worker categories. About 13 percent were in establishments with 500 to 999 workers and the remaining 7 percent were in establishments of 50-499 workers.

Location. Slightly more than three-fourths of the workers were located in the Mountain States of Arizona,

⁸ See appendix A for scope and method of the survey. Earnings data in this bulletin exclude premium pay for overtime and for work on weekends, holidays, and late shifts.

⁹ For job descriptions, see appendix B.

¹⁰ The copper content of crude (untreated) copper ore is constantly declining. In 1942, a ton of crude ore and old tailings yielded, on the average, about 1.09 percent copper after treatment and smelting. By 1971, this value had fallen to .55 percent. *Mineral Facts and Problems* (Bureau of Mines 1956), p. 22; *Minerals Yearbook* (Bureau of Mines, 1971), p. 461.

¹¹ *Indexes of Output Per Man-Hour: Selected Industries* Bulletin 1780 (Bureau of Labor Statistics, 1973), p. 13; "Copper Industry in December 1972," *Mineral Industry Surveys*, February 28, 1973 (Bureau of Mines) p. 2.

Montana, New Mexico, and Utah. Arizona alone accounted for half of the employment. Nevada accounted for another one-tenth.

Unionization. Establishments operating under collective bargaining agreements accounted for virtually all of the industry's production and related workers in September 1972. The United Steelworkers of America (AFL-CIO) was the predominant union in the industry.

Method of wage payment. Virtually all workers were paid time rates, almost exclusively under plans providing single rates for specified occupations. Incentive paid workers, limited primarily to miners, were typically paid individual or group bonuses.

Average hourly earnings

The 27,046 production and related workers in copper ore mining averaged \$4.43 an hour in September 1972 (table 9), with 93 percent of the workers earning between \$3.50 and \$5. Twenty-two percent earned from \$3.50 to \$4; 28 percent from \$4 to \$4.50; and 43 percent from \$4.50 to \$5. Virtually all time-rated workers had earnings under \$5.50, whereas three-fifths of the incentive workers earned above that amount.¹²

Earnings were highly compressed in this industry. The index of dispersion (computed by dividing the middle range by the median) was 15 percent—the fourth lowest among industries surveyed by the Bureau in the last decade.¹³ The high incidence of single-rate pay systems for specified occupations, the predominance of a single union, geographic concentration, and the presence of relatively few large, multiplant companies contributed to this narrow dispersion.

Occupational earnings

Occupations selected to represent the industry's wage structure accounted for slightly more than three-fifths of the production and related workers. Among these jobs, average hourly earnings ranged from \$5.25 for power-shovel operators to \$3.64 for change room attendants (table 10). Truckdrivers, the largest occupational group, averaged \$4.61; those who hauled ore averaged \$4.65.

Averages among various jobs tended to fall within a relatively narrow band. Of the 38 occupations (excluding subcategories of jobs), 30 had averages between \$4.23 and \$4.94.

For workers in skilled maintenance crafts, occupational averages ranged from \$4.68 (maintenance mechanics) to \$4.81 (machinists). Other maintenance crafts and their averages were electricians, \$4.80; heavy duty

mechanics, \$4.78; automotive mechanics, \$4.73; and welders, \$4.70.

Among the five occupations related to ore treatment, averages ranged from \$4.23 for primary crusher operators to \$4.44 for filter operators.

Workers in occupations classified under mining operations had a higher range of averages—a \$1.61 spread. Both the highest and lowest occupational averages in the survey (\$5.25 for power-shovel operators and \$3.64 for change room attendants) were found in mining operations.

Miners, who accounted for more than nine-tenths of the incentive paid workers, had the widest dispersion of individual earnings, ranging from \$2.60 to over \$7. The 703 incentive paid miners, slightly more than half under bonus systems, averaged \$5.61 an hour; the 844 time-rated miners averaged \$4.38.

Establishment practices and supplementary wage benefits

Data were also obtained on certain establishment practices and supplementary wage benefits, including work schedules, shift differentials, paid holidays, paid vacations, and various health, insurance, and retirement plans.

Work schedules. Nearly two-thirds of the industry's production workers were in establishments scheduling their personnel on 5-day, 40-hour workweeks (table 11). Slightly less than one-third were subject to 5-day, 37½-hour workweek. Others were on longer schedules.

Shift provisions and practices. All copper mining establishments studied had provisions for late shifts

¹² The straight-time average hourly earnings in this bulletin differ in concept from the gross average hourly earnings published in the Bureau's monthly hours and earnings series. Unlike the latter, estimates presented here exclude premium pay for overtime and for work on weekends, holidays, and late or other shifts. Average earnings were calculated by summing individual hourly earnings and dividing by the number of individuals; in the monthly series, the sum of the man-hour totals reported by establishments in the industry is divided into the reported payroll totals. Thus, the average in this bulletin is not comparable with the average (\$4.75 in September 1972) for the copper ores industry (SIC 102) provided in the monthly series.

The estimate of production workers within scope of the study is intended only as a general guide to the size and composition of the labor force included in the survey. It differs from the monthly series (31,200) in September 1972 because (1) auxiliary units and establishments employing fewer than 50 workers were excluded and (2) the list of establishments was assembled considerably in advance of data collection. Thus, new establishments are omitted as are those that are no longer operating or found out of scope at the time of the survey.

¹³ The industries recording lower dispersion factors were motor vehicles manufacturing, April 1969 (6 percent); bituminous coal mining, January 1967 (13 percent); and petroleum refining, April 1971 (14 percent).

in September 1972 (table 12). Slightly more than one-fifth of the workers were actually employed on second shifts, and just under one-fifth on third shifts. All late-shift employees received differential pay above day rates, usually 10 cents an hour for second shifts and 20 cents an hour for third shifts.

Paid holidays. All workers were in establishments providing paid holidays, with nine-tenths receiving 8 days annually (table 13). All, or virtually all, received New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving, and Christmas. The two other holidays most frequently provided were Easter Sunday¹⁴ and Christmas Eve.

Paid vacations. All establishments provided their workers with paid vacations after qualifying periods of service (table 14). Typical vacation provisions for workers covered by the survey were 1 week's pay after 1 year of service, 2 weeks after 3 years, 3 weeks after 10 years, and 4 weeks after 20 years. Nearly three-tenths received 5 weeks after 25 years of service.

Health, insurance, and retirement plans. Seven-eighths or more of the workers were in establishments

providing at least part of the cost of life, sickness and accident, hospitalization, surgical, and basic and major medical insurance (table 15). Nearly all were covered by retirement pension plans, in addition to those provided by Federal social security, and slightly more than one-eighth by retirement severance pay provisions. A large majority of the pension and other insurance plans were wholly financed by the employer.

Other selected benefits. Technological severance pay for employees permanently separated from their jobs as a result of force reduction or the closing of a mine or unit was applicable to slightly less than one-half of the workers (table 16). More than nine-tenths were in establishments having supplemental unemployment benefit plans that augment State unemployment payments to laid-off workers, and periodic cost-of-living adjustment for wages based on changes in the BLS Consumer Price Index.

¹⁴ In establishments where Easter Sunday was considered a holiday, Sunday was a regular part of the workweek. Easter Sunday, however, was not worked in these establishments, and employees were given a day's pay at straight-time rates.

Table 9. Copper ore mining: Earnings distribution

(Percent distribution of production and related workers, by average straight-time hourly earnings and by method of wage payment, United States, September 1972)

Hourly earnings ¹	All workers	Time-workers	Incentive workers	Hourly earnings ¹	All workers	Time-workers	Incentive workers
Under \$3.00 -----	0.2	0.1	1.1	\$5.50 and under \$5.60 -----	0.2	-	7.0
\$3.00 and under \$3.10 -----	.1	.1	.5	\$5.60 and under \$5.70 -----	(²)	-	1.7
\$3.10 and under \$3.20 -----	.2	.2	.1	\$5.70 and under \$5.80 -----	(²)	-	.5
\$3.20 and under \$3.30 -----	.3	.3	1.1	\$5.80 and under \$5.90 -----	(²)	-	.5
\$3.30 and under \$3.40 -----	.5	.5	.7	\$5.90 and under \$6.00 -----	.2	.2	.5
\$3.40 and under \$3.50 -----	.3	.3	.1	\$6.00 and under \$6.10 -----	1.0	-	35.3
\$3.50 and under \$3.60 -----	.9	.9	.3	\$6.10 and under \$6.20 -----	.1	-	2.0
\$3.60 and under \$3.70 -----	5.2	5.3	.4	\$6.20 and under \$6.30 -----	(²)	-	1.1
\$3.70 and under \$3.80 -----	1.6	1.7	.1	\$6.30 and under \$6.40 -----	(²)	-	.8
\$3.80 and under \$3.90 -----	6.0	6.1	.7	\$6.40 and under \$6.50 -----	(²)	-	.8
\$3.90 and under \$4.00 -----	8.6	8.9	-	\$6.50 and under \$6.60 -----	(²)	-	1.2
\$4.00 and under \$4.10 -----	2.2	2.2	.5	\$6.60 and under \$6.70 -----	(²)	-	.5
\$4.10 and under \$4.20 -----	4.4	4.4	1.6	\$6.70 and under \$6.80 -----	(²)	-	.3
\$4.20 and under \$4.30 -----	6.9	7.1	1.2	\$6.80 and under \$6.90 -----	(²)	-	.4
\$4.30 and under \$4.40 -----	3.0	3.0	2.6	\$6.90 and under \$7.00 -----	(²)	-	1.6
\$4.40 and under \$4.50 -----	11.4	11.6	2.1	\$7.00 and under \$7.10 -----	(²)	-	.9
\$4.50 and under \$4.60 -----	9.5	9.8	2.1	\$7.10 and under \$7.20 -----	-	-	-
\$4.60 and under \$4.70 -----	9.8	9.9	7.9	\$7.20 and under \$7.30 -----	(²)	-	.3
\$4.70 and under \$4.80 -----	13.5	13.8	3.2	\$7.30 and under \$7.40 -----	(²)	-	.5
\$4.80 and under \$4.90 -----	4.8	4.9	2.0	\$7.40 and under \$7.50 -----	-	-	-
\$4.90 and under \$5.00 -----	5.2	5.3	.9	\$7.50 and over -----	.1	-	4.6
\$5.00 and under \$5.10 -----	1.5	1.4	2.2	Total -----	100.0	100.0	100.0
\$5.10 and under \$5.20 -----	1.0	1.0	2.4	Number of workers -----	27,046	26,286	760
\$5.20 and under \$5.30 -----	.4	.3	2.1	Average hourly earnings ¹ -----	\$4.43	\$4.39	\$5.58
\$5.30 and under \$5.40 -----	.1	(²)	2.0				
\$5.40 and under \$5.50 -----	.7	.7	1.8				

¹ Excludes premium pay for overtime and for work on weekends, holidays and late shifts.

² Less than 0.05 percent.

NOTE: Because of rounding, sums of individual items may not equal 100.

Table 10. Copper ore mining: Occupational earnings

(Number and average straight-time hourly earnings¹ of workers in selected occupations, United States, September 1972)

Occupation	Number of workers receiving straight-time hourly earnings ¹ of—																										
	Number of workers	Average hourly earnings	\$2.60	\$2.80	\$3.00	\$3.20	\$3.40	\$3.60	\$3.80	\$4.00	\$4.20	\$4.40	\$4.60	\$4.80	\$5.00	\$5.20	\$5.40	\$5.60	\$5.80	\$6.00	\$6.20	\$6.40	\$6.60	\$6.80	\$7.00		
			and under \$2.80	\$3.00	\$3.20	\$3.40	\$3.60	\$3.80	\$4.00	\$4.20	\$4.40	\$4.60	\$4.80	\$5.00	\$5.20	\$5.40	\$5.60	\$5.80	\$6.00	\$6.20	\$6.40	\$6.60	\$6.80	\$7.00	or more		
<u>Mining operations</u>																											
Brakemen	143	4.41	-	-	-	-	-	-	-	2	26	115	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Bulldozer operators (fine grade)	245	4.57	-	-	-	6	-	-	-	-	1	163	11	64	-	-	-	-	-	-	-	-	-	-	-	-	
Cage tenders	182	4.54	-	-	-	4	-	3	-	-	2	49	124	-	-	-	-	-	-	-	-	-	-	-	-	-	
Car repairmen	59	4.68	-	-	-	-	-	-	-	-	-	29	2	28	-	-	-	-	-	-	-	-	-	-	-	-	
Change room attendants	52	3.64	1	-	6	-	2	29	9	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Drillers, machine	207	4.68	-	-	-	2	-	-	-	5	9	27	118	34	12	-	-	-	-	-	-	-	-	-	-	-	
Groundmen	70	3.82	-	12	-	-	-	15	12	-	31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Laborers, underground	683	3.89	8	-	-	55	68	-	443	109	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Loading-machine operators	184	4.52	-	-	-	2	17	-	3	119	5	12	2	3	3	7	2	2	3	1	1	1	1	1	1	1	
Miners	1,547	4.94	6	2	5	13	1	76	5	13	26	764	107	20	32	28	60	15	6	274	13	14	5	15	47		
Power-shovel operators	424	5.25	-	-	-	-	4	3	7	-	-	14	-	8	153	37	153	-	45	-	-	-	-	-	-	-	
Pumpmen	85	4.40	-	-	-	-	3	-	4	-	36	21	21	-	-	-	-	-	-	-	-	-	-	-	-	-	
Roofmen	66	4.74	-	-	-	-	-	-	-	4	43	13	-	-	-	-	-	-	-	6	-	-	-	-	-	-	
Shot firers	68	4.23	-	-	1	-	-	-	3	45	5	2	12	-	-	-	-	-	-	-	-	-	-	-	-	-	
Shuttle-car operators ²	530	4.42	-	-	8	-	-	26	-	-	104	303	89	-	-	-	-	-	-	-	-	-	-	-	-	-	
Gasoline or battery powered	391	4.35	-	-	8	-	-	26	-	-	104	164	89	-	-	-	-	-	-	-	-	-	-	-	-	-	
Underground servicemen	169	4.24	-	-	-	-	3	-	33	45	35	53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
<u>Ore treatment operations</u>																											
Concentrator operators	98	4.25	-	-	-	-	-	-	4	54	23	4	9	-	4	-	-	-	-	-	-	-	-	-	-	-	
Crusher operators	345	4.32	-	4	-	9	-	11	47	22	102	59	72	7	12	-	-	-	-	-	-	-	-	-	-	-	
Primary crusher	190	4.23	-	-	-	9	-	11	40	16	66	15	14	7	12	-	-	-	-	-	-	-	-	-	-	-	
Secondary crusher	155	4.42	-	4	-	-	-	-	7	6	36	44	58	-	-	-	-	-	-	-	-	-	-	-	-	-	
Filter operators	197	4.44	-	-	-	-	8	-	3	9	45	58	74	-	-	-	-	-	-	-	-	-	-	-	-	-	
Flotation operators	171	4.30	-	-	4	-	-	-	3	7	117	28	-	12	-	-	-	-	-	-	-	-	-	-	-	-	
Rod and ball-mill operators	225	4.35	-	-	-	-	3	-	-	11	95	111	5	-	-	-	-	-	-	-	-	-	-	-	-	-	
<u>Mining and ore treatment operations</u>																											
Clean-up equipment operators	378	4.52	-	-	-	-	-	-	2	6	95	184	91	-	-	-	-	-	-	-	-	-	-	-	-	-	
Conveyor operators	82	3.95	-	-	-	2	-	49	12	7	4	-	-	-	8	-	-	-	-	-	-	-	-	-	-	-	
Engineers, stationary	77	4.88	-	-	-	-	-	-	-	-	-	17	20	21	4	-	15	-	-	-	-	-	-	-	-	-	
Electricians, maintenance	794	4.80	-	-	1	-	4	-	-	-	6	26	516	202	-	39	-	-	-	-	-	-	-	-	-	-	
Helpers, maintenance trades	644	4.00	-	-	-	8	-	25	429	101	81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Hoistmen	152	4.55	-	-	-	6	6	23	-	-	8	21	49	13	26	-	-	-	-	-	-	-	-	-	-	-	
Laborers other than underground	1,768	3.66	3	-	29	12	152	1,289	283	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Locomotive engineers	268	4.81	-	-	-	-	-	-	-	-	5	65	1	197	-	-	-	-	-	-	-	-	-	-	-	-	
Machinists, maintenance	408	4.81	-	-	-	-	-	-	-	-	2	9	250	147	-	-	-	-	-	-	-	-	-	-	-	-	
Mechanics, automotive	139	4.73	-	-	-	-	-	-	-	-	4	1	115	19	-	-	-	-	-	-	-	-	-	-	-	-	
Mechanics, heavy duty	1,472	4.78	-	-	-	-	2	-	-	-	23	11	792	644	-	-	-	-	-	-	-	-	-	-	-	-	
Mechanics, maintenance	843	4.68	-	-	-	9	-	27	-	-	9	145	434	219	-	-	-	-	-	-	-	-	-	-	-	-	
Oilers and greasers	412	4.25	-	1	-	-	2	6	71	55	168	109	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Steel sharpeners	10	4.38	-	-	-	-	-	-	-	3	3	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	
Trackmen	466	3.81	-	-	-	72	-	9	313	42	-	25	5	-	-	-	-	-	-	-	-	-	-	-	-	-	
Truckdrivers	2,575	4.61	-	3	2	8	4	-	8	113	75	1,021	1,018	86	237	-	-	-	-	-	-	-	-	-	-	-	
Ore haulage ²	2,296	4.65	-	3	-	8	-	-	8	-	35	-	933	994	86	237	-	-	-	-	-	-	-	-	-	-	
65 to 84 tons	700	4.58	-	-	-	-	-	-	-	-	32	-	405	185	78	-	-	-	-	-	-	-	-	-	-	-	
85 to 99 tons	674	4.62	-	-	-	-	-	-	-	-	-	-	242	432	-	-	-	-	-	-	-	-	-	-	-	-	
100 tons or more	557	4.81	-	-	-	-	-	-	-	-	-	-	204	108	8	237	-	-	-	-	-	-	-	-	-	-	
Service or water	279	4.33	-	-	2	-	4	-	8	78	75	88	24	-	-	-	-	-	-	-	-	-	-	-	-	-	
Welders, maintenance	632	4.70	-	-	-	-	-	-	-	-	2	90	479	55	-	-	-	-	-	-	-	-	-	-	-	-	

¹ Excludes premium pay for overtime and for work on weekends, holidays, and late shifts.

² Includes data for workers in classifications in addition to those shown separately.

Table 11. Copper ore mining: Work schedules

(Percent of production workers in establishments by scheduled weekly hours and days, ¹ United States, September 1972)

Weekly hours and days ¹	Percent
All production workers -----	100
37½ hours-5 days -----	33
40 hours-5 days -----	64
42½ hours-5 days -----	(²)
44 hours-5½ days -----	(²)
48 hours-6 days -----	2

¹ Data relate to the predominant work schedule of full-time day-shift workers in each establishments.

² Less than 0.5 percent.

NOTE: Because of rounding, sums of individual items may not equal totals.

Table 12. Copper ore mining: Shift provisions and practices

(Percent of production workers by shift differential provisions¹ and practices, United States, September 1972)

Shift differential	Percent of production workers—			
	In establishments having formal provisions ¹ for—		Actually working on—	
	Second shifts	Third or other late shifts	Second shifts	Third or other late shifts
Total -----	100.0	100.0	20.7	17.1
With shift pay differential -----	100.0	100.0	20.7	17.1
Uniform cents per hour -----	100.0	100.0	20.7	17.1
6 cents -----	.7	-	.2	-
8 cents -----	1.1	-	.1	-
9 cents -----	8.3	-	2.0	-
10 cents -----	89.9	.7	18.5	.1
12 cents -----	-	.4	-	(²)
14 cents -----	-	2.6	-	.4
15 cents -----	-	11.1	-	1.7
16 cents -----	-	.7	-	.1
18 cents -----	-	5.7	-	1.3
20 cents -----	-	78.8	-	13.5

¹ Refers to policies of establishments either currently operating late shifts or having provisions covering late shifts.

² Less than 0.05 percent.

NOTE: Because of rounding, sums of individual items may not equal totals.

Table 13. Copper ore mining: Paid holidays

(Percent of production workers in establishments with formal provisions for paid holidays, United States, September 1972)

Number of paid holidays and holidays provided	Percent
All production workers -----	100
Workers in establishments providing:	
Paid holidays -----	100
6 days -----	(¹)
7 days -----	4
8 days -----	90
9 days -----	6
Holidays provided:	
New Year's Day -----	100
Washington's Birthday -----	4
Good Friday -----	3
Easter Sunday -----	68
Memorial Day -----	99
Fourth of July -----	100
Labor Day -----	100
Thanksgiving Day -----	100
Day after Thanksgiving -----	2
Christmas Eve -----	85
Christmas Day -----	100
New Year's Eve -----	2
Other—1 day -----	16
Other—2 days -----	11

¹ Less than 0.5 percent.

NOTE: Because of rounding, sums of individual items may not equal totals.

Table 14. Copper ore mining: Paid vacations

(Percent of production workers in establishments with formal provisions for paid vacations, United States, September 1972)

Vacation policy	Percent	Vacation policy	Percent
All production workers -----	100	<u>Amount of vacation pay²—Continued</u>	
<u>Method of payment</u>		After 10 years of service:	
Workers in establishments providing paid vacations ¹ -----	100	2 weeks -----	(³)
Length-of-time payment -----	89	Over 2 and under 3 weeks -----	4
Percentage payment -----	11	3 weeks -----	82
		Over 3 and under 4 weeks -----	11
Workers in establishments providing paid vacations -----		4 weeks -----	3
		After 12 years of service:	
<u>Amount of vacation pay²</u>		2 weeks -----	(³)
After 1 year of service:		Over 2 and under 3 weeks -----	1
1 week -----	85	3 weeks -----	86
Over 1 and under 2 weeks -----	12	Over 3 and under 4 weeks -----	11
2 weeks -----	3	4 weeks -----	3
After 2 years of service:		After 15 years of service:	
1 week -----	82	2 weeks -----	(³)
Over 1 and under 2 weeks -----	13	Over 2 and under 3 weeks -----	(³)
2 weeks -----	5	3 weeks -----	82
After 3 years of service:		Over 3 and under 4 weeks -----	14
1 week -----	9	4 weeks -----	3
Over 1 and under 2 weeks -----	2	Over 4 and under 5 weeks -----	(³)
2 weeks -----	75	After 20 years of service:	
Over 2 and under 3 weeks -----	14	2 weeks -----	(³)
After 5 years of service:		Over 2 and under 3 weeks -----	(³)
Over 1 and under 2 weeks -----	(³)	3 weeks -----	17
2 weeks -----	83	4 weeks -----	69
Over 2 and under 3 weeks -----	14	Over 4 and under 5 weeks -----	11
3 weeks -----	3	5 weeks -----	3
		After 25 years of service: ⁴	
		2 weeks -----	(³)
		Over 2 and under 3 weeks -----	(³)
		3 weeks -----	17
		4 weeks -----	43
		Over 4 and under 5 weeks -----	11
		5 weeks -----	28

¹ Service payments either during the summer or at the end of the year to workers with specified periods of service were classified as vacation pay regardless of whether workers took time off from work.

² Vacation payments such as percent of annual earnings were converted to an equivalent time basis. Periods of service were chosen arbitrarily and do not necessarily reflect individual establishment provisions for progression. For example, changes indicated at the end of 10 years may include changes which occurred between 5 and 10 years.

³ Less than 0.5 percent.

⁴ Vacation provisions were the same after longer periods of service.

NOTE: Because of rounding, sums of individual items may not equal 100.

Table 15. Copper ore mining: Health, insurance, and retirement plans

(Percent of production workers in establishments with specified health, insurance, and retirement plans,¹ United States, September 1972)

Type of plan ¹	Percent	Type of plan ¹	Percent
All production workers -----	100	Workers in establishments providing--	
Workers in establishments providing:		Continued	
Life insurance -----	98	Hospitalization insurance -----	100
Noncontributory plans -----	82	Noncontributory plans -----	87
Accidental death and dismemberment		Surgical insurance -----	100
insurance -----	91	Noncontributory plans -----	87
Noncontributory plans -----	79	Medical insurance -----	100
Sickness and accident insurance or		Noncontributory plans -----	87
sick leave or both ² -----	87	Major medical insurance -----	100
Sickness and accident insurance		Noncontributory plans -----	87
Noncontributory plans -----	82	Retirement plans ³ -----	99
Sick leave (full pay, no waiting period) -----	13	Pension plans -----	99
Sick leave (partial pay or waiting period) -----	1	Noncontributory plans -----	99
		Severance pay -----	13

¹ Includes only those plans for which the employer pays at least part of the cost and excludes legally required plans, such as workmen's compensation and social security. However, plans required by State temporary disability laws are included if the employer contributes more than is legally required or the employees receive benefits in excess of the legal requirements. "Noncontributory plans" include only those plans financed entirely by the employer.

² Unduplicated total of workers receiving sick leave or sickness and accident insurance shown separately.

³ Unduplicated total of workers covered by pension or retirement severance payments shown separately.

Table 16. Copper ore mining: Other selected benefits

(Percent of production workers in establishments providing technological severance pay, supplemental unemployment benefits, extended vacations and cost-of-living adjustments,¹ United States, September 1972)

Item ¹	Percent
All production workers -----	100
Workers in establishments with provisions for:	
Technological severance pay -----	45
Supplemental unemployment benefits -----	93
Extended vacations -----	-
Cost-of-living adjustments -----	93
Based on CPI -----	93
Other basis -----	-

¹ For definition of items see appendix A.

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Part III. Lead and Zinc Ore Mining

Summary

Straight-time earnings of production and related workers in the lead and zinc ore mining industry averaged \$4.20 an hour in September 1972. Four-fifths of the 6,586 workers covered by the survey¹⁵ earned from \$3 to \$5 an hour; the middle half fell between \$3.50 and \$4.55.

Among occupations selected to represent the wage structure of the industry, earnings levels ranged from \$5.26 an hour for miners to \$3.23 an hour for surface laborers.¹⁶ Miners, the industry's largest occupational group, accounted for one-fourth of the production employment.

Paid holidays, paid vacations, and at least part of the cost of various health and insurance benefits were provided all workers. Nine-tenths of the workers also were covered by retirement plans.

Industry characteristics

Establishments within scope of the survey employed 6,586 production and related workers (virtually all men) in September 1972. Mining and ore treatment operations were included in the survey; smelting and refining operations were excluded.

Mine production of recoverable lead reached a 43-year high in 1972 at 618,915 short tons. Lead production has grown with the increasing use of the metal for such items as automobile batteries and gasoline antiknock devices. Zinc mine production, however, fell to 478,318 short tons—a decrease of 5 percent from 1971 and more than 20 percent since 1965. Although demand for the metal continued to be high in 1972, the closing of smelters that were unable to meet government antipollution standards and other factors tended to discourage the mining of zinc ore.¹⁷

Facilities. Establishments operating ore treatment facilities in connection with their mines accounted for virtually all of the production and related workers in the survey. Underground mining complexes accounted for nearly seven-eighths of the workers; a combination of rail and rubber-tired vehicles were

the most common methods of ore haulage from working face to mine hoist or exit at these sites.

Size of establishment. Employment levels among establishments varied substantially. Slightly less than one-fourth of the survey's workers were in establishments with 100-249 total employment. About three-eighths each were employed in establishments with 250-499 workers and 500 workers or more.

Location. Approximately one-third of the workers were employed in Missouri and Tennessee, with one-fourth of the industry's employment in Missouri and almost one-tenth in Tennessee. The remaining two-thirds of the work force was distributed widely throughout the country.

Unionization. More than nine-tenths of the workers were in establishments with union contracts covering a majority of their production workers. The United Steelworkers of America (AFL-CIO) was the largest union in the industry.

Method of wage payment. Seven-tenths of the workers were paid time rates in September 1972, almost always under formal plans providing single rates for specified occupations. Bonus plans applied to approximately seven-tenths of the 2,022 incentive workers. The remainder received individual or group piece rates. Incentives were paid almost exclusively to workers involved in mining operations, primarily to the miners.

Average hourly earnings

The 6,586 production and related workers in lead and zinc ore mining averaged \$4.20 an hour in September 1972 (table 17). Employee earnings in this industry were widely dispersed in comparison to other mining industries studied by the Bureau. The index of

¹⁵ For scope and method of survey, see appendix A. Earnings data in this bulletin exclude premium pay for overtime and for work on weekends, holidays, and late shifts.

¹⁶ See appendix B for occupational descriptions.

¹⁷ "Lead Industry in December 1973," *Mineral Industry Surveys*, February 28, 1974 (Bureau of Mines), p. 5; "Zinc Industry in December 1973," *Mineral Industry Surveys*, February 22, 1974 (Bureau of Mines), p. 5.

wage dispersion, computed by dividing the middle range by the median, was 27 percent.¹⁸

Slightly more than one-half of the workers earned between \$3 and \$4 an hour; another one-third earned between \$4 and \$5. One-eighth of the workers earned from \$5 to over \$10.

Occupational averages

Occupations selected to represent the industry's wage structure accounted for two-thirds of the production and related workers. Miners, the largest group, were the highest paid, averaging \$5.26 an hour. Surface laborers had the lowest average—\$3.23 an hour (table 18).

Of the jobs studied separately, loading-machine operators had the second highest hourly average at \$4.45. Only five others had averages exceeding \$4 an hour: automotive mechanics, \$4.11; heavy duty mechanics, \$4.25; maintenance electricians, \$4.09; maintenance machinists, \$4.40; and roofmen, \$4.01.

Establishment practices and supplementary wage benefits

Data were also obtained on certain establishment practices and supplementary wage benefits for production workers, including work schedules, shift differentials, paid holidays, paid vacations, and specified health, insurance and retirement plans.

Work schedules. Five-day work schedules were predominant in the industry: 40-hour schedules applied to three-fifths of the workers and 37½-hour schedules to about one-third (table 19). One-tenth of the production workers were scheduled for 6 days, 48 hours a week.

Shift provisions and practices. All employees were in establishments with provisions for late shifts (table 20). Slightly less than three-tenths of the employees worked second shifts and one-tenth third shifts at the time of the study; virtually all received pay differentials. Second-shift employees typically received 8 to 14 cents an hour above day rates; third-shift workers received from 9 to 20 cents an hour; the latter amount was the most common.

Paid holidays. All production workers were in establishments granting paid holidays. Slightly more than three-fifths received 8 days annually and slightly more than three-tenths received 7 days (table 21). Among the holidays reported, at least nine-tenths of the workers received New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving, and Christmas.

Paid vacations. Paid vacations, after qualifying periods of service, were provided by all establishments (table 22). At least two-thirds of the workers received 1 week's vacation pay after 1 year of service, 2 weeks after 3 years, 3 weeks after 10 years, and 4 weeks or more after 25 years.

Nearly three-tenths of the workers were in establishments granting 5 weeks or more after 30 years of service.

Health, insurance, and retirement plans. Nine-tenths or more of the workers were in establishments providing at least part of the cost of life, sickness and accident, hospitalization, surgical, and basic medical insurance (table 23). Three-fourths were covered by accidental death and dismemberment and major medical insurance.

Retirement pension plans, in addition to Federal social security, applied to seven-eighths of the workers. Retirement severance plans, on the other hand, were rare. The employer paid for a large majority of all health, insurance, and retirement plans studied.

Other selected benefits. Slightly more than one-fourth of the production workers were employed by establishments having technological severance pay plans for workers permanently separated from their jobs because of a reduction in work force or a mine or unit closing (table 24). Supplemental unemployment benefit plans, which augment State unemployment programs, covered about 6 percent of the workers.

Establishments employing about one-tenth of the workers provided periodic cost-of-living adjustments based on changes in the BLS Consumer Price Index.

¹⁸ Other mining industries surveyed by the Bureau showed indexes of dispersion ranging from 13 to 20 percent. See parts I and II of this bulletin.

Table 17. Lead and zinc ore mining: Earnings distribution

(Percent distribution of production and related workers, by average straight-time hourly earnings and method of wage payment, United States, September 1972)

Hourly earnings ¹	All workers	Time workers	Incentive workers	Hourly earnings ¹	All workers	Time workers	Incentive workers
Under \$ 3.00 -----	2.4	3.5	-	\$ 5.50 and under \$ 5.60 -----	0.2	-	0.5
\$ 3.00 and under \$ 3.10 -----	2.0	2.8	.2	\$ 5.60 and under \$ 5.70 -----	.4	-	1.4
\$ 3.10 and under \$ 3.20 -----	3.5	5.0	.1	\$ 5.70 and under \$ 5.80 -----	.4	-	1.2
\$ 3.20 and under \$ 3.30 -----	4.7	6.6	.6	\$ 5.80 and under \$ 5.90 -----	.4	-	1.3
\$ 3.30 and under \$ 3.40 -----	5.1	7.1	.8	\$ 5.90 and under \$ 6.00 -----	.7	-	2.1
\$ 3.40 and under \$ 3.50 -----	7.1	9.0	2.8	\$ 6.00 and under \$ 6.10 -----	.3	-	1.1
\$ 3.50 and under \$ 3.60 -----	7.3	9.6	2.0	\$ 6.10 and under \$ 6.20 -----	.3	-	1.1
\$ 3.60 and under \$ 3.70 -----	7.3	8.4	5.0	\$ 6.20 and under \$ 6.30 -----	.7	-	2.2
\$ 3.70 and under \$ 3.80 -----	5.0	5.7	3.3	\$ 6.30 and under \$ 6.40 -----	.4	-	1.4
\$ 3.80 and under \$ 3.90 -----	6.2	5.3	8.2	\$ 6.40 and under \$ 6.50 -----	.7	-	2.2
\$ 3.90 and under \$ 4.00 -----	2.1	2.2	1.9	\$ 6.50 and under \$ 6.60 -----	.4	-	1.2
\$ 4.00 and under \$ 4.10 -----	9.1	10.3	6.6	\$ 6.60 and under \$ 6.70 -----	.6	-	1.8
\$ 4.10 and under \$ 4.20 -----	5.9	6.4	4.9	\$ 6.70 and under \$ 6.80 -----	.7	-	2.3
\$ 4.20 and under \$ 4.30 -----	4.1	4.4	3.3	\$ 6.80 and under \$ 6.90 -----	.8	-	2.6
\$ 4.30 and under \$ 4.40 -----	1.6	1.2	2.4	\$ 6.90 and under \$ 7.00 -----	.6	-	2.0
\$ 4.40 and under \$ 4.50 -----	.7	.6	.8	\$ 7.00 and under \$ 7.10 -----	.2	-	.5
\$ 4.50 and under \$ 4.60 -----	1.9	2.1	1.4	\$ 7.10 and under \$ 7.20 -----	.3	(²)	.9
\$ 4.60 and under \$ 4.70 -----	.9	.3	2.2	\$ 7.20 and under \$ 7.30 -----	.3	-	.9
\$ 4.70 and under \$ 4.80 -----	4.7	2.8	9.2	\$ 7.30 and under \$ 7.40 -----	.2	-	.6
\$ 4.80 and under \$ 4.90 -----	3.8	4.9	1.1	\$ 7.40 and under \$ 7.50 -----	.1	-	.3
\$ 4.90 and under \$ 5.00 -----	.8	.7	1.0	\$ 7.50 and over -----	2.3	-	7.4
\$ 5.00 and under \$ 5.10 -----	1.1	1.0	1.2	Total -----	100.0	100.0	100.0
\$ 5.10 and under \$ 5.20 -----	.4	(²)	1.3	Number of workers -----	6,586	4,564	2,022
\$ 5.20 and under \$ 5.30 -----	.3	.1	.9	Average hourly earnings ¹ -----	\$4.20	\$3.77	\$5.18
\$ 5.30 and under \$ 5.40 -----	.6	-	1.9				
\$ 5.40 and under \$ 5.50 -----	.4	-	1.3				

¹ Excludes premium pay for overtime and for work on weekends, holidays, and late shifts.² Less than 0.05 percent.

NOTE: Because of rounding, sums of individual items may not equal 100.

Table 18. Lead and zinc ore mining: Occupational averages

(Number and average straight-time hourly earnings¹ of workers in selected occupations, United States, September 1972)

Occupation	Number of workers	Average hourly workers	Occupation	Number of workers	Average hourly workers
<u>Mining operations</u>			<u>Ore treatment operators—</u> Continued		
Cage tenders -----	74	3.56	Filter operators -----	35	3.61
Car repairmen -----	8	3.60	Flotation operators -----	66	3.69
Change room attendants -----	23	3.35	Rod- and ball-mill operators -----	58	3.59
Laborers, underground -----	369	3.42	<u>Mining and ore treatment operations</u>		
Loading-machine operators -----	166	4.45	Clean-up equipment operators -----	12	3.93
Miners -----	1,642	5.26	Conveyor operators -----	25	3.36
Pumpmen -----	13	3.44	Electricians, maintenance -----	161	4.09
Roofmen -----	83	4.01	Helpers, maintenance trades -----	33	3.29
Shuttle-car operators -----	156	3.65	Hoistmen -----	178	3.69
Electric overhead powered -----	26	3.65	Laborers, other than underground -----	149	3.23
Other (gasoline or battery powered) --	130	3.65	Machinists, maintenance -----	213	4.40
Underground-equipment operator -----	42	3.98	Mechanics, automotive -----	10	4.11
Underground servicemen -----	157	3.63	Mechanics, heavy duty -----	190	4.25
<u>Ore treatment operations</u>			Mechanics, maintenance -----	263	3.89
Concentrator operators -----	45	3.76	Oilers and greasers -----	10	3.54
Crusher operators -----	118	3.45	Steel sharpeners -----	18	3.61
Primary crusher -----	57	3.42	Trackmen -----	77	3.55
Secondary crusher -----	61	3.48	Welders, maintenance -----	67	3.86

¹ Excludes premium pay for overtime and for work on weekends, holidays and late shifts.

Table 19. Lead and zinc ore mining: Work schedules

(Percent of production workers in establishments by scheduled weekly hours and days, ¹ United States, September 1972)

Weekly hours and days ¹	Percent
All production workers -----	100
37½ hours-5 days -----	32
40 hours-5 days -----	59
48 hours-6 days -----	9

¹ Data relate to the predominant work schedule of full-time day-shift workers in each establishment.

Table 20. Lead and zinc ore mining: Shift provisions and practices

(Percent of production workers by shift differential provisions¹ and practices, United States, September 1972)

Shift differential	Percent of production workers—			
	In establishments having formal provisions ¹ for—		Actually working on—	
	Second shifts	Third or other late shifts	Second shifts	Third or other late shifts
Total -----	100	98.4	28.2	10.1
With shift differential -----	98.4	98.4	27.5	10.1
Uniform cents per hour -----	98.4	98.4	27.5	10.1
6 cents -----	6.5	-	2.4	-
7 cents -----	1.2	-	5.9	-
8 cents -----	29.6	-	5.9	-
9 cents -----	1.3	5.4	5.5	.1
10 cents -----	29.6	12.4	8.3	1.5
11 cents -----	7.8	-	2.6	-
12 cents -----	4.4	28.0	1.9	1.9
13 cents -----	-	1.2	-	-
14 cents -----	3.4	12.2	1.4	.8
16 cents -----	-	12.6	-	1.6
18 cents -----	-	9.8	-	-
20 cents -----	14.6	16.6	4.2	4.2
With no shift differential -----	1.6	-	.7	-

¹ Refers to policies of establishments either currently operating late shifts or having provisions covering late shifts.

NOTE: Because of rounding, sums of individual items may not equal totals.

**Table 21. Lead and zinc ore mining:
Paid holidays**

(Percent of production workers in establishments with formal provisions for paid holidays, United States, September 1972)

Number of paid holidays and holidays provided	Percent
All production -----	100
Workers in establishments providing paid holidays -----	100
4 days -----	3
7 days -----	31
8 days -----	63
9 days -----	2
Holidays provided:	
New Year's Day -----	100
Good Friday -----	35
Easter Sunday -----	2
Easter Monday -----	4
Memorial Day -----	91
Fourth of July -----	100
Labor Day -----	100
Veteran's Day -----	12
Thanksgiving Day -----	92
Day after Thanksgiving -----	2
Christmas Eve -----	58
Christmas Day -----	100
New Year's Eve -----	9
Employee's birthday -----	20
Floating holiday -----	8
Other—1 day -----	4
Other—2 days -----	19

NOTE: Because of rounding, sums of individual items may not equal totals.

**Table 22. Lead and zinc ore mining:
Paid vacations**

(Percent of production workers in establishments with formal provisions for paid vacations, United States, September 1972)

Vacation policy	Percent	Vacation policy	Percent
All production workers -----	100	<u>Amount of vacation pay²—Continued</u>	
<u>Method of payment</u>		<u>After 12 years of service—Continued</u>	
Workers in establishments providing --paid vacations ¹ -----	100	4 weeks -----	20
Length-of-time payment -----	85	Over 5 and under 6 weeks -----	3
Percentage payment -----	15	<u>After 15 years of service:</u>	
<u>Amount of vacation pay²</u>		2 weeks -----	10
<u>After 1 year of service:</u>		3 weeks -----	60
1 week -----	77	Over 3 and under 4 weeks -----	5
Over 1 week and under 2 weeks -----	5	4 weeks -----	16
2 weeks -----	15	Over 4 and under 5 weeks -----	5
Over 2 weeks and under 3 weeks -----	3	Over 5 and under 6 weeks -----	3
<u>After 2 years of service:</u>		<u>After 20 years of service:</u>	
1 week -----	70	2 weeks -----	10
Over 1 and under 2 weeks -----	12	3 weeks -----	29
2 weeks -----	15	Over 3 and under 4 weeks -----	5
Over 3 and under 4 weeks -----	3	4 weeks -----	47
<u>After 3 years of service:</u>		Over 4 and under 5 weeks -----	5
1 week -----	4	Over 5 and under 6 weeks -----	3
2 weeks -----	80	<u>After 25 years of service:</u>	
Over 2 and under 3 weeks -----	12	2 weeks -----	10
Over 3 and under 4 weeks -----	3	3 weeks -----	9
<u>After 5 years of service:</u>		Over 3 and under 4 weeks -----	5
2 weeks -----	70	4 weeks -----	66
Over 2 and under 3 weeks -----	11	5 weeks -----	1
3 weeks -----	16	Over 5 and under 6 weeks -----	9
Over 4 and under 5 weeks -----	3	<u>After 30 years of service:</u>	
<u>After 10 years of service:</u>		2 weeks -----	10
2 weeks -----	12	3 weeks -----	9
Over 2 and under 3 weeks -----	6	Over 3 and under 4 weeks -----	5
3 weeks -----	67	4 weeks -----	49
Over 3 and under 4 weeks -----	5	5 weeks -----	19
4 weeks -----	5	Over 5 and under 6 weeks -----	9
Over 5 and under 6 weeks -----	3	<u>Maximum vacation:</u>	
<u>After 12 years of service:</u>		2 weeks -----	10
2 weeks -----	12	3 weeks -----	9
3 weeks -----	59	Over 3 and under 4 weeks -----	5
Over 3 and under 4 weeks -----	5	4 weeks -----	49
		5 weeks -----	19
		Over 5 and under 6 weeks -----	3
		6 weeks -----	5

¹ Service payments either during the summer or at the end of the year to workers with specified periods of service were classified as vacation pay regardless of whether worker took time off from work.

² Vacation payments such as percent of annual earnings were converted to an equivalent time basis. Periods of service were chosen arbitrarily and do not necessarily reflect individual establishment provisions for progression. For example, changes indicated at 10 years may include changes which occurred between 5 and 10 years.

NOTE: Because of rounding, sums of individual items may not equal 100.

Table 23. Lead and zinc ore mining: Health, insurance, and retirement plans

(Percent of production workers in establishments with specified health insurance and retirement plans, ¹ United States, September 1972)

Type of plan ¹	Percent	Type of plan ¹	Percent
All production workers -----	100	Workers in establishments providing—	
Workers in establishments providing:		Continued	
Life insurance -----	100	Hospitalization insurance -----	100
Noncontributory plans -----	75	Noncontributory plans -----	83
Accidental death and dismemberment		Surgical insurance -----	100
insurance -----	75	Noncontributory plans -----	83
Noncontributory plans -----	55	Medical insurance -----	100
Sickness and accident insurance or		Noncontributory plans -----	83
sick leave or both ² -----	96	Major medical insurance -----	76
Sickness and accident insurance -----	96	Noncontributory plans -----	61
Noncontributory plans -----	79	Retirement plans ³ -----	91
Sick leave (full pay, no waiting period)---	-	Pension plans -----	86
Sick leave (partial pay or waiting period)---	-	Noncontributory plans -----	86
		Severance pay -----	5

¹ Includes those plans for which the employer pays at least part of the cost and excludes legally required plans, such as workmen's compensation and social security. However, plans required by State temporary disability laws are included if the employer contributes more than is legally required or the employees receive benefits in excess of the legal requirements. "Noncontributory plans" include only those financed entirely by the employer.

² Unduplicated total of workers receiving sick leave or sickness and accident insurance shown separately.

³ Unduplicated total of workers covered by pension or retirement severance pay plans shown separately.

Table 24. Lead and zinc ore mining: Other selected benefits

(Percent of production workers in establishments providing technological severance pay, supplemental unemployment benefits, extended vacations, and cost-of-living adjustments, United States, September 1972)

Item ¹	Percent
All production workers -----	100
Workers in establishments with provisions for:	
Technological severance pay -----	28
Supplemental unemployment benefits -	6
Extended vacations -----	-
Cost-of-living adjustments -----	11
Based on CPI -----	11
Other basis -----	-

¹ For definition of items see appendix A.

Appendix A. Scope and Method of Survey

Scope of survey

The survey covered establishments primarily engaged in the following activities as defined by the 1967 *Standard Industrial Classification Manual* prepared by the U.S. Office of Management and Budget:

1. Mining, beneficiating, or otherwise preparing iron ores valued chiefly for their iron content (SIC 1011).
2. Mining, milling, or otherwise preparing copper ores (SIC 1021).
3. Mining, milling, or otherwise preparing lead ores, zinc ores, or lead-zinc ores (SIC 1031).

The survey excluded all smelting and refining operations, ore treatment facilities directly connected with smelters located away from the mine, and independently owned ore treatment plants that were not part of a single economic unit as defined below.

The establishments (see definition below) were selected from those employing 50 workers or more at the time of reference of the data used in compiling the universe lists.

The number of establishments surveyed by the Bureau, as well as the number estimated to be within the scope of the survey during the payroll period studied, is shown in table A-1.

Method of study

Data were obtained by personal visits of the Bureau's field staff to a representative sample of establishments in each industry. To obtain appropriate accuracy at minimum cost, a greater proportion of large than of small establishments was visited. In combining the data, however, all establishments were given their appropriate weight. All estimates are presented, therefore, as relating to all establishments in the industry, excluding only those below the minimum size at the time of reference of the universe data.

Establishment definition

An establishment is defined as: (1) A mine or mines without an ore treatment plant; or (2) a mine or mines with an ore treatment plant operated by a

company as a single economic unit. Such an establishment is defined as a single economic unit if it has common supervision over the day-to-day activities or common support facilities, such as maintenance and office.

Employment

The estimates of the number of workers within scope of the study are intended as a general guide to the size and composition of the labor force included in the survey. The advance planning necessary to make a wage survey requires the use of lists of establishments assembled considerably in advance of the payroll period studied.

Production workers

The term "production workers," as used in this bulletin, includes working foremen and all nonsupervisory workers engaged in nonoffice functions. All workers in smelting and refining operations were excluded, as were administrative, executive, professional, and technical personnel, and force-account construction employees, who were utilized as a separate work force on the firm's own properties.

Occupations selected for study

Occupational classification was based on a uniform set of job descriptions designed to take account of interestablishment and interarea variations in duties within the same job. (See appendix B for these descriptions.) The occupations were chosen for their numerical importance, their usefulness in collective bargaining, or their representativeness of the entire job scale in the industry. Working supervisors, apprentices, learners, beginners, trainees, and handicapped, part-time, temporary, and probationary workers were not reported in the data for selected occupations, but were included in the data for all production workers.

Wage data

Information on wages related to straight-time hourly earnings, excluding premium pay for overtime and

for work on weekends, holidays, and late or other shifts. Incentive payments, such as those resulting from piecework or production bonus systems, and cost-of-living bonuses were included as part of the workers' regular pay, but nonproduction bonus payments, such as Christmas or yearend bonuses, were excluded.

Average (mean) hourly rates or earnings for each occupation or other group of workers, such as production workers, were calculated by weighting each rate (or hourly earnings), by the number of workers receiving the rate, totaling, and dividing by the number of individuals. The hourly earnings of salaried workers were obtained by dividing straight-time salary by normal rather than actual hours.

The median designates position; that is, one-half of the employees surveyed receive more than this rate and one-half receive less. The middle range is defined by two rates of pay; one-fourth of the employees earn less than the lower of these rates and one-fourth earn more than the higher rate.

Method of wage payment

Statements of method of wage payment relate to the number of workers paid under various time and incentive wage systems. Formal rate structures for time-rated workers provide single rates or a range of rates for individual job categories. In the absence of a formal rate structure, pay rates are determined primarily by the qualifications of the individual worker. A single rate structure is one in which the same rate is paid to all experienced workers in the same job classification. Learners, apprentices, or probationary workers may be paid according to rate schedules which start below the single rate and permit the workers to achieve the full job rate over a period of time. Individual experienced workers may occasionally be paid above or below the single rate for special reasons, but such payments are regarded as exceptions. Range of rate plans are those in which the minimum and/or maximum rates paid experienced workers for the same job are specified. Specific rates of individual workers within the range may be determined by merit, length of service, or a combination of various concepts of merit and length of service. Incentive workers are classified under piecework or bonus plans. Piecework is work for which a predetermined rate is paid for each unit of output. Production bonuses are based on production in excess of a quota or for completion of a job in less than standard time.

Work schedules

Data refer to the predominant work schedule (hours and days per week) for full-time production workers employed on the day shift.

Shift provisions and practices

Shift provisions relate to the policies of establishments either currently operating late shifts or having formal provisions covering late shift work. Practices relate to workers employed on late shifts at the time of the survey.

Supplementary wage provisions

Supplementary benefits were treated statistically on the basis that if formal provisions were applicable to half or more of the production workers in an establishment, the benefits were considered applicable to all such workers. Similarly, if fewer than one-half of the workers were covered, the benefit was considered nonexistent in the establishment. Because of length-of-service and other eligibility requirements, the proportion of workers receiving the benefits may be smaller than estimated.

Paid holidays. Paid holiday provisions relate to full-day and half day holidays provided annually.

Paid vacations. The summaries of vacation plans are limited to formal arrangements, excluding informal plans whereby time off with pay is granted at the discretion of the employer or the supervisor. Payments not on a time basis were converted; for example, a payment of 2 percent of annual earnings was considered the equivalent of 1 week's pay. The periods of service for which data are presented were selected as representative of the most common practices, but they do not necessarily reflect individual establishment provisions for progression. For example, the changes in proportions indicated at 10 years of service may include changes which occurred between 5 and 10 years.

Extended vacations. Data relate to formal plans providing for additional vacation pay at a specified interval. Such plans commonly provide 13 weeks of vacation every 5 years to the "Senior Group" (one-half of employees with longest continuous service) and 3 weeks in addition to regular vacation every 5 years for the "Junior Group."

Health, insurance, and retirement plans. Data are presented for health, insurance, pension, and retirement severance plans for which the employer pays all or part of the cost, excluding programs required by law, such as workmen's compensation and social security. Among the plans included are those underwritten by a commercial insurance company and those paid

directly by the employer from his current operating funds or from a fund set aside for this purpose.

Death benefits are included as a form of life insurance. Sickness and accident insurance is limited to that type of insurance under which predetermined cash payments are made directly to the insured on a weekly or monthly basis during illness or accident disability. Information is presented for all such plans to which the employer contributes at least a part of the cost. However, in New York and New Jersey, where temporary disability insurance laws require employer contributions,¹ plans are included only if the employer (1) contributes more than is legally required or (2) provides the employees with benefits which exceed the requirements of the law.

Tabulations of paid sick leave plans are limited to formal plans which provide full pay or a proportion of the worker's pay during absence from work because of illness; informal arrangements have been omitted. Separate tabulations are provided for (1) plans which provide full pay and no waiting period, and (2) plans providing either partial pay or a waiting period.

Medical insurance refers to plans providing for complete or partial payment of doctors' fees. Such plans may be underwritten by a commercial insurance company or a nonprofit organization, or they may be a form of self-insurance.

Major medical insurance, sometimes referred to as extended medical insurance, includes the plans designed to cover employees for sickness or injury involving an expense which goes beyond the normal coverage of hospitalization, medical, and surgical plans.

Tabulations of retirement pensions are limited to plans which provide, upon retirement, regular payments

for the remainder of the retiree's life. Data are presented separately for retirement severance pay (one payment or a specified number over a period of time) made to employees upon retirement. Establishments providing retirement severance payments and pensions to employees upon retirement were considered as having both retirement pension and retirement severance pay. Establishments having optional plans providing employees a choice of either retirement severance payments or pensions were considered as having only retirement pension benefits.

Supplemental unemployment benefits

Data relate to formal plans designed to supplement benefits paid under State unemployment insurance systems.

Technological severance pay

Data relate to formal provisions for severance pay to workers permanently separated from employment as a result of force reduction arising out of the introduction of new equipment or from department or unit closing.

Cost-of-living adjustments

Provisions for cost-of-living adjustments relate to formal plans whereby wage rates are increased periodically in keeping with changes in the BLS Consumer Price Index or on some other basis.

¹ The temporary disability insurance laws in California and Rhode Island do not require employer contributions.

Table A-1. Estimated number of establishments and workers within scope of survey, and number studied, iron, copper, and lead and zinc ore mining, September 1972

Industry	Number of establishments		Workers in establishments		
	Within scope of study	Actually studied	Within scope of study		Actually studied
			Total ¹	Production workers	Total
All industries combined	86	73	57,233	46,760	52,142
Iron ore mining	30	20	16,167	13,128	13,463
Copper ore mining	31	29	33,122	27,046	30,938
Lead and zinc ore mining	25	24	7,944	6,586	7,741

¹ Includes executive, professional, office and other workers excluded from the production worker category shown separately.

Appendix B. Occupational Descriptions

The primary purpose of preparing job descriptions for the Bureau's wage surveys is to assist its field staff in classifying into appropriate occupations workers who are employed under a variety of payroll titles and different work arrangements from establishment to establishment and from area to area. This classification permits the grouping of occupational wage rates representing comparable job content. Because of the emphasis on interestablishment and interarea comparability of occupational content, the Bureau's job descriptions may differ significantly from those in use in individual establishments or those prepared for other purposes. In applying these job descriptions, the Bureau's field staff are instructed to exclude working supervisors, apprentices, learners, beginners, trainees; handicapped, part-time, temporary, and probationary workers.

Balling-drum operator

Operates balling drum to produce green iron pellets. Work involves: Regulating speed of balling drums, cutter bars, and feeds; conducting tests of moisture, compression, and screen structure; and adjusting water and other controls for proper balling. May clean bins, chutes, and screens when necessary. Excludes operators of ball mills in the concentrator section of the plant (see rod- and ball-mill operator).

Brakeman

(Coupler; nipper; rope rider; trip rider)

Rides on trains or trips of cars hauled by locomotive or hoisting cable or chain, and assists in their transportation. Work involves *most of the following*: Operating or throwing switches; coupling and uncoupling cars or attaching and detaching cars to cable; opening and closing ventilation doors; and directing movement of train by signaling operator.

Bulldozer operator (fine grade)

Operates tractor with concave steel scraper mounted in front of chassis to fine grade roadways and other areas. May build dams and ponds. Excludes quad operators (those operating bulldozers pushing scrapers) and operators cleaning up around shovels and crushers (see clean-up equipment operator).

Cage tender

(Skip tender)

Controls operation of cages between levels of mine and surface. Work involves *most of the following*: Pushing or pulling loaded cars off cage at surface and replacing them with empty cars or cars with supplies or personnel; pulling cars from cage at bottom or other levels of mine and moving them onto sidings; and signaling hoistman to raise or lower cage. May load cage with materials and record number of cars and production from mine.

Car repairman

(Mine-car repairer)

Reconditions mine cars by repairing worn or broken parts or by replacing such parts with new ones. Work involves *most of the following*: Inspecting mine cars, noting the condition of various parts, and determining need for repair or replacement of parts; and making replacements of worn or broken parts such as axles, wheels, and couplings.

Change room attendant

Keeps change room and offices clean and orderly. Work involves *most of the following*: Maintaining cleanliness of change rooms, hallways, showers, toilets,

etc.; handling mine lamps in and out of charging racks; observing boilers and making minor adjustments; supplying materials; and making minor repairs to lockers, etc.

Clean-up equipment operator

Operates mobile equipment such as rubber-tire or track payloader or bulldozer to clean up loose ore or rock in and around surface mine or mill. Places large boulders aside for blasting. May work in conjunction with a power shovel.

Concentrator operator

(Panelboard operator)

Operates panelboard to control all or most of the machinery and equipment in the concentrator mill involving such operations as conveying, feeding, crushing, grinding, reagent handling, flotation classifying, drying, and loading. Work involves *most of the following*: Starting, stopping, and operating concentrating equipment; observing, checking, and manipulating all controls; and making necessary adjustments to regulate ore flow and air, water, fuel, chemicals, lubrication, etc.

Conveyor operator

(Loader-head man; boom man)

Operates the conveyor or conveyor loading boom to transport ore or materials about mine or ore treatment plant. Work involves *most of the following*: Starting specified boom conveyor and conveyor belts; regulating conveyor speed as required; and observing controls to detect malfunctions of conveyor system. May oil, grease, and make minor adjustments to conveyor system, and may operate drum hoist to position cars under conveyor.

Crusher operator

Operates a crushing machine to break up ore. Work involves: Regulating flow of ore to and from crusher; breaking up large chunks or prodding them through crusher; and cleaning, oiling, and making minor repairs.

For wage study purposes, crusher operators are classified by type of crusher as follows:

Primary crusher

Secondary crusher

NOTE: Primary crushing machines are frequently located in a mine or pit.

Driller, machine

Operates truck or tractor mounted machine to drill ore body to make holes for explosives in surface mines. Work involves *most of the following*: Positioning drilling equipment and making power connections; drilling shot holes as needed to obtain desired breakage from blasting; and lubricating, adjusting, and making minor repairs to machine. May, in addition, direct work of a helper and insert and set off charges of explosives in the holes. Excludes workers primarily drilling blast holes to break up large boulders.

Dumper

(Car dumper)

Operates a car-dumping device to unload mine cars or trucks. May direct ore into separate bins by means of an unloading chute and move cars to and from the dumping device.

Engineer, stationary

Operates and maintains and may also supervise the operation of stationary engines and equipment (mechanical or electrical) to supply the establishment in which employed with power, heat, refrigeration, or air-conditioning. Work involves: Operating and maintaining equipment such as steam engines, air compressors, generators, motors, turbines, ventilating and refrigerating equipment, steam boilers and boiler-fed water pumps; making equipment repairs; keeping a record of operation of machinery, temperature, and fuel consumption. May *also* supervise these operations. *Head or chief engineers in establishments employing more than one engineer are excluded.*

Electrician, maintenance

Performs a variety of electrical trade functions such as the installation, maintenance, or repair of equipment for the generation, distribution, or utilization of electric energy in an establishment. Work involves *most of the following*: Installing or repairing any of a variety of electrical equipment such as generators, transformers, switchboards, controllers, circuit breakers, motors, heating units, conduit systems, or other transmission equipment; working from blueprints, drawings, layout, or other specifications; locating and diagnosing trouble in the electrical system or equipment; working standard computations relating to load requirements of wiring or electrical equipment; using a variety of electrician's handtools and measuring and testing instruments. In general, the work of the maintenance electrician requires rounded training and experience

usually acquired through a formal apprenticeship or equivalent training and experience.

Filter operator

(Concentrate dryer man)

Operates machine to filter, dry, and load concentrates in preparation for shipment. Work involves: Controlling flow of air, fuel, and feed into disc, drum, or belt filter; regulating speed of rotation and vacuum suction; and checking discharge end for proper formation of cake. May load ore into cars.

Flotation operator

Operates flotation machinery for the recovery of concentrates. Work involves: Starting, stopping, and observing operation of flotation machines, reagent dispensers, tanks, and related equipment; checking froth in flotation units; and mixing reagents and adjusting reagent feeds.

Furnace operator

(Kiln operator)

Operates furnace or kiln to produce fired pellets. Work involves *most of the following*: Starting and stopping equipment; regulating temperatures, flows, and pressures; observing instrument on control panel; and controlling feed rates in wet, dry, and firing sections. Kiln operators may fire guns to break up rings in kiln.

Groundman

(Pitman; shovel operator helper)

Performs a variety of duties to aid operation of a power shovel employed in removing ore in a pit mine. Work involves *a combination of the following*: Moving up power lines or water lines and other supplies when power shovel is moved to a new position in the mine; removing obstructions in path of shovel; blocking treads or wheels to steady shovel; and moving rock within reach of power shovel, using a pick and shovel. May oil shovel.

Helper, maintenance trades

Assists one or more workers in the skilled maintenance trades, by performing specific or general duties of lesser skill, such as keeping a worker supplied with materials and tools; cleaning working area, machine, and equipment; assisting worker by holding materials or tools; performing other unskilled tasks

as directed by journeyman. The kind of work the helper is permitted to perform varies from trade to trade. In some trades, the helper is confined to supplying, lifting, and holding materials and tools and cleaning working areas; and in others he is permitted to perform specialized machine operations, or parts of a trade that are also performed by workers on a full-time basis.

Hoistman

Operates underground or surface hoisting machinery to move cages or skips. Work involves: Controlling movement; stopping cage or skip tender at proper levels; inspecting machinery for defects; and adjusting brakes.

Laborer, other than underground

Performs manual labor in surface mine, yard, or mill area. Work involves: Repairing railroad tracks, ties, etc.; digging ditches; breaking rock or ore; and loading and unloading supplies. May do minor lubricating.

Laborer, underground

Performs general manual tasks in an underground mine. Work involves: Digging and cleaning ditches, walkways, etc.; loading and unloading tools and supplies; and performing clean-up work or other laboring tasks. Uses handtools such as picks and shovels.

Loading-machine operator

(Duckbill self-loading-conveyor operator; Joy loader operator; Jeffrey loader operator; loading-machine runner; mobile-loader operator, mucking machine operator, ore hauler, scraper-loader operator)

Operates one of a variety of ore-loading machines used to gather loose ore (or rock) at the working face of an underground mine and transport it to designated location such as trucks, mine cars, or conveyors. Work involves *most of the following*: Inspecting and testing roof of working area for unsafe condition and setting up supports where necessary; moving track rubber tire or crawler-tread mounted machine to working face; manipulating machine controls to position the gathering head and to move machine as necessary in gathering and loading the ore; directing the activities of helpers; and greasing, oiling, and making minor repairs and adjustments to machine.

Locomotive engineer

Operates train for haulage, switching, and servicing work in and about mine or mill. May control locomotive by remote radio control. May operate feeders and also signal power shovel or haulage trucks when loading and unloading.

Machinist, maintenance

Produces replacement parts and new parts in making repairs of metal parts of mechanical equipment operated in an establishment. Work involves *most of the following*: Interpreting written instructions and specifications; planning and laying out of work; using a variety of machinist's handtools and precision measuring instruments; setting up and operating standard machine tools; shaping of metal parts to close tolerances; making standard shop computations relating to dimensions of work, tooling, feeds and speeds of machining; knowledge of the working properties of the common metals; selecting standard materials, parts, and equipment required for his work; fitting and assembling parts into mechanical equipment. In general, the machinist's work normally requires a rounded training in machine-shop practice usually acquired through a formal apprenticeship or equivalent training and experience.

Mechanic, automotive

Repairs automobiles, buses, motortrucks, and tractors of an establishment. Work involves *most of the following*: Examining automotive equipment to diagnose source of trouble; disassembling equipment and performing repairs that involve the use of such handtools as wrenches, gauges, drills, or specialized equipment in disassembling or fitting parts; replacing broken or defective parts from stock; grinding and adjusting valves; reassembling and installing the various assemblies in the vehicle and making necessary adjustments; aligning wheels, adjusting brakes and lights, or tightening body bolts. In general, the work of the automotive mechanic requires rounded training and experience usually acquired through a formal apprenticeship or equivalent training and experience.

Mechanic, heavy duty

(Diesel engine mechanic)

Performs major overhauls and repair of diesel engines and equipment such as trucks, drillers, power shovels, etc. Work involves *most of the following*: Diagnosing trouble and determining nature and extent of repairs; removing cylinder heads and pistons, cylinder

linings, connecting rods, bearings, and all auxiliary parts such as hoist cylinders, hose assemblies, electric and hydraulic equipment; and setting up and operating automotive machine tools such as valve grinders and honing machines. In general, the work of the heavy-duty mechanic requires rounded training and experience usually acquired through a formal apprenticeship or equivalent training and experience.

Excludes workers repairing railroad diesel engines.

Mechanic, maintenance

Repairs machinery or mechanical equipment of an establishment. Work involves *most of the following*: Examining machines and mechanical equipment to diagnose source of trouble; dismantling or partly dismantling machines and performing repairs that mainly involve the use of handtools in scraping and fitting parts; replacing broken or defective parts with items obtained from stock; ordering the production of a replacement part by a machine shop or sending of the machine to a machine shop for major repairs; preparing written specifications for major repairs or for the production of parts ordered from machine shop; reassembling machines; and making all necessary adjustments for operation. In general, the work of a maintenance mechanic requires rounded training and experience usually acquired through a formal apprenticeship or equivalent training and experience. Excluded from this classification are workers whose *primary duties* involve setting up or adjusting machines.

Miner

(Operating driller)

Performs a number of the following tasks in underground mines: Drilling blast holes; charging holes with explosives; arranging for proper guarding of all entrances to the area; firing charges; inspecting results of blasts and reblasts where necessary. May scale loose rock from walls or roof of working places.

Oiler and greaser

Lubricates, with oil or grease, the moving parts of wearing surfaces of mechanical equipment of an establishment. Excludes workers classified as conveyor belt cleaner.

Pellet-mill operator

(Panelboard operator)

Operates panelboard to control all or most of the machinery and equipment in a pellet mill such as

kiln system cooler, screens, balling discs, pumps, feeders, tripper systems, and conveyors. Work involves *most of the following*: Starting, regulating, and stopping pellet plant equipment; observing panel for fuel, power, temperature, and pressure readings; checking operation of dust collection system; igniting kiln burner and regulating flow of fuel, and maintaining flow of materials to grinding mill and balling discs.

Power-shovel operator

(Power-shovel engineer)

Operates diesel or electric powered shovels to load ore or other material into trucks or other transportation equipment in a surface mine.

Pumpman

(Pump operator; pumper)

Operates one or more motor-driven pumps used to remove excess water from work areas in an underground or surface mine. Work involves *most of the following*: Setting or assisting in the work of setting the pumps at desired locations, or in laying, connecting, and repairing pipe or hose lines; starting and stopping pumps; making necessary adjustments or minor repairs to equipment; and reporting on water levels in work areas.

Roofman

(Roof bolter, barman-trimmer)

Maintains mine roofs, walls, and pillars for the protection of underground employees and equipment from rock falls. Work involves: Drilling holes for sheaves, pins, and cables; and installing roof supporting equipment, pillars, air lines, and water lines. May drill and blast.

Rod- and ball-mill operator

Operates rod and ball machines to pulverize ore. Work involves: Charging mill with round stones, steel balls, rods, or other grinding materials; regulating flow of ore and water into mill and controlling rotation speed to grind ore properly; and lubricating and making minor repairs to machinery. Exclude operators of balling-drums in iron pellet mills (see balling-drum operator).

Shot firer

(Blaster, shooter; shot firemen)

Blasts ore, or rock, loose from solid mass by charging, tamping, and setting off charges of explosives in drilled holes in a surface mine. Work involves *most of the following*: Preparing and placing explosive charge with primer inserted in shot hole, tamping charge in place; filling remainder of shot hole with noncombustible material, tamping it tightly and leaving a detonator wire extending outside the hole; preparing blasting equipment and setting off charge; examining areas in which charges have been set off and reporting on number and location of holes fired and those that fail to go off.

Shuttle-car operator

(Motorman)

Operates gas, battery or electrically powered engine that pulls rail shuttle car in mine to transport supplies or ore from face to designated location.

For wage study purposes, shuttle-car operators are classified by type of car as follows:

Electric overhead powered

Other (gas or battery)

Steel sharpener

(Bit grinder; bit sharpener)

Shapes, sharpens, and tempers drill steel and bits. Work involves: Shaping and sharpening bits on grinding machine; drilling steel on anvil or press; and tempering drills by heating and quenching in liquids.

Trackman

(Roadman; track layer)

Prepares the track bed, and lays, maintains, and repairs rail tracks in underground or surface mine. Work involves *most of the following*: Preparing track bed by grading; placing ties in position; laying and spacing rails, spiking or clamping rails to ties, joining rail sections and installing switches; inspecting established track to detect possible defects, making adjustments or replacements as necessary; and removing rails, ties, and other track parts from areas where they are no longer needed. May bond track.

Truckdriver

Drives a truck to transport ore or other materials and equipment or men in and around the mine,

loading docks, and other areas as required. May also load or unload truck with or without helpers, make minor mechanical repairs, and keep truck in good working order.

For wage survey purposes, truckdrivers are classified by type of truck and mine as follows:

Iron, lead and zinc

Ore haulage

Service or water

Combination of types

Copper

Ore haulage

Under 65 tons

65 to 84 tons

85 to 99 tons

100 tons or more

Combination of types

Service or water

Combination of types

Underground-equipment operator

Operates mobile equipment in underground mines, such as lift trucks, front-end loader, truck, load hauler, backhoe, road grader, and bulldozer to maintain roads and ditches, and move and position equipment and supplies. Does not include equipment operators trans-

porting or loading ore or waste at face of mine (see loading-machine operator).

Underground serviceman

(Mine utility man, pipe-ventilation man)

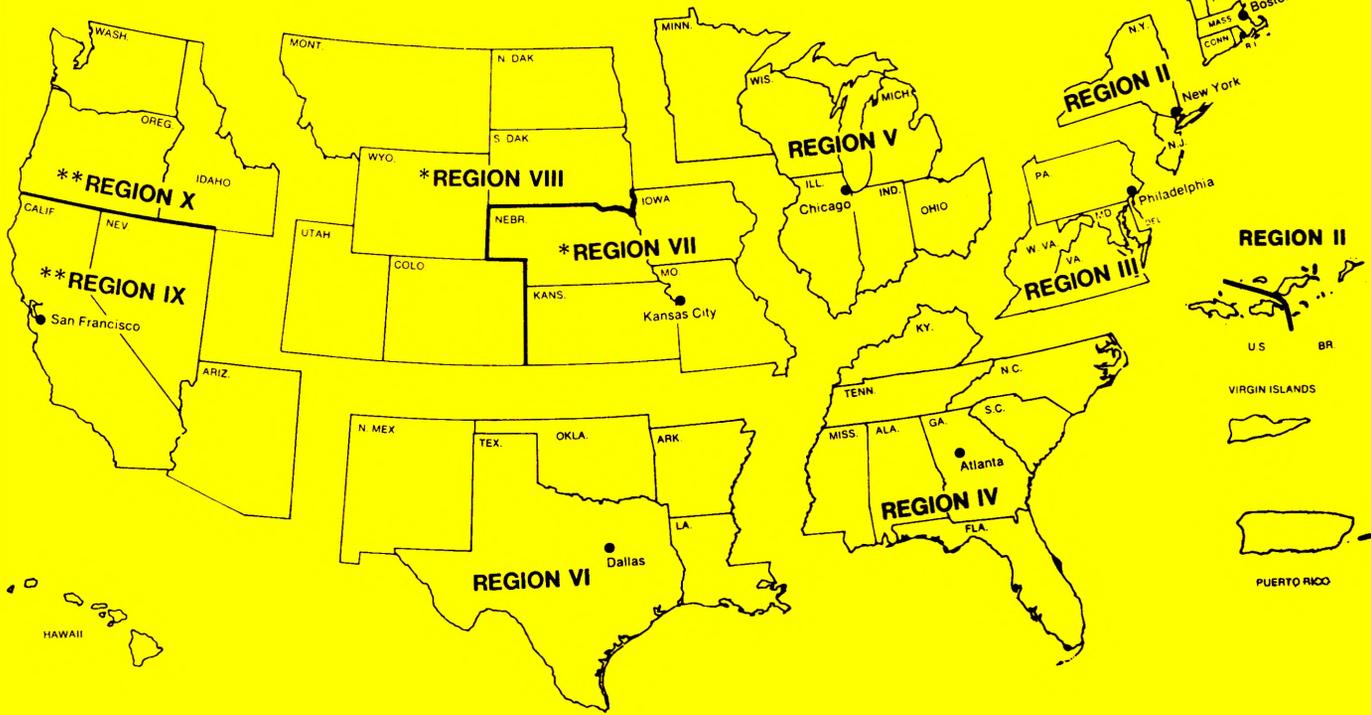
Performs a wide range of service functions in support of mining activities. Work involves *most of the following*: Installing air, water, and vent pipes and dismantling used pipe; installing pumps; building and installing vent doors, chutes, grizzlies, bulk heads, and pouring concrete. May use lift truck, drills, front-end loader, and welding equipment in work.

Welder, maintenance

Performs the welding duties necessary to maintain machinery and equipment in good repair, by fusing (welding) metal objects together in the fabrication of metal shapes and in repairing broken or cracked metal objects. Work involves *most of the following*: Planning and laying out work from written or oral instructions and specifications; knowledge of welding properties of a variety of metals and alloys; setting up of work and determining operation sequence; welding a variety of items as necessary; ability to weld with gas and arc apparatus.

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