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METAL-MINE ACCIDENTS

IN THE

UNITED STATES

DURING THE CALENDAR YEAR 1932

BY

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METAL-MINE ACCIDENTS IN THE UNITED STATES DURING THE CALENDAR YEAR 1932^{1 2}

By WILLIAM W. ADAMS³

INTRODUCTION

A more favorable accident-prevention record was made by the metal-mining industry of the United States in the calendar year 1932 than in any other year since 1911, when yearly records of accidents were first published by the United States Bureau of Mines. The combined rate covering both fatal and nonfatal accidents was the lowest on record. The accident-frequency rate covering nonfatal injuries was the best ever recorded, and the fatality rate was lower than for any other year except 1928 and 1931.

Due to the unfavorable economic conditions that prevailed during the year the number of men employed at the mines in 1932 was smaller than in previous years, as were also the average number of workdays per man and the total number of man-hours worked by all employees.

Reports received by the Bureau of Mines from operating companies in all States showed a total of 53,288 men employed in and about all metal mines and nonmetallic mines other than coal mines. This figure is the summation of the average number of employees at individual mines, the average for each mine being the average number of men working at the mine during such part of the year as the mine was in operation (not the total number of names on the pay roll). It does not, however, include the large number of individuals, probably 10 to 20 thousand or more, who during the past 2 or 3 years have spent much of their time prospecting for gold or panning for gold in numerous localities in the Western States. The total working time for all employees exclusive of work of this character (that is, the total exposure to occupational hazards) was 11,095,167 man-shifts or 92,038,326 man-hours, an average of 208 shifts, or 1,727 hours for each of the 53,288 employees.

Men working underground numbered 31,321 and averaged 1,675 hours of exposure or employment per man. Open-cut mines employed 5,325 men, who averaged 1,598 hours per man. Workers at surface shops and yards at the mines (not including mills and smelters) numbered 16,642; they averaged 1,866 hours of exposure per man during the year.

¹ Work on manuscript completed Nov. 9, 1933.

² The statistical canvass of the metal-mining industry and the work incident to the preparation of the statistical tables in this publication were conducted by Mrs. M. E. Kolhos and L. E. Geyer of the Bureau of Mines.

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Accidents resulted in 107 deaths and 5,014 nonfatal lost-time injuries, each injury resulting in disability for more than the remainder of the day on which the accident occurred. The nonfatal injuries included 10 permanent total disabilities and 167 permanent partial disabilities. As the men were exposed to hazards for 92,038,326 man-hours, the fatality rate per million hours was 1.16 and the nonfatal-injury rate 54.48. The previous year's rates were 1.01 and 55.76, respectively.

The fatality rate for men employed underground increased slightly and the injury rate remained stationary; both the fatality and injury rates for open-cut mining increased; the fatality rate for surface employees increased, and the injury rate declined.

The chief causes of fatal accidents were falling rock or ore from the roof or wall, explosives, and falls of persons down chutes, winzes, raises, or stopes. Nonfatal injuries of a temporary character were due mainly to falling roof or wall, loading rock at the working face, haulage, hand tools, and drilling.

Among the larger mining States—those employing 1,000 or more men—South Dakota had the best fatality record. This State employed 1,473 men for 3,829,054 man-hours without a fatal accident. The best nonfatal-injury record was that of Minnesota, where the 3,511 men employed in mining worked 6,258,736 man-hours with only 88 injuries, the relative frequency being 14.06 injuries per million man-hours of exposure.

Table 1 shows the relative standing of the States that employed 1,000 or more men, classified according to fatality and injury rates.

TABLE 1.—*Relative standing of States having 1,000 or more men employed at mines, in 1932, classified according to number of men employed and fatality and injury rates per million man-hours of labor performed*

Relative standing	State	Number of men employed	Relative standing	State	Fatality rate ¹	Relative standing	State	Injury rate ¹
1	Michigan.....	7,368	1	South Dakota.....		1	Minnesota.....	14.06
2	California.....	5,646	2	Minnesota.....	0.32	2	Alabama.....	23.92
3	Arizona.....	3,750	3	New Mexico.....	.36	3	Tennessee.....	27.26
4	Minnesota.....	3,511	4	Michigan.....	.43	4	Michigan.....	27.93
5	Idaho.....	3,232	5	Texas.....	.60	5	Texas.....	34.12
6	Alaska.....	3,149	6	Alabama.....	.67	6	Alaska.....	35.70
7	Alabama.....	2,888	7	Alaska.....	.83	7	South Dakota.....	47.79
8	Utah.....	2,711	8	Nevada.....	.88	8	Arizona.....	48.53
9	Montana.....	2,200	9	Tennessee.....	1.03	9	Missouri.....	49.23
10	Missouri.....	2,095	10	Missouri.....	1.13	10	Nevada.....	53.89
11	Colorado.....	1,891	11	Arizona.....	1.46	11	New Mexico.....	54.32
12	South Dakota.....	1,473	12	Utah.....	1.46	12	Montana.....	60.07
13	New Mexico.....	1,442	13	Montana.....	1.75	13	Idaho.....	80.77
14	Nevada.....	1,345	14	Idaho.....	1.80	14	California.....	92.42
15	Texas.....	1,237	15	California.....	2.49	15	Utah.....	94.84
16	Tennessee.....	1,096	16	Colorado.....	2.88	16	Colorado.....	109.87
	Total United States.....	53,288		Average United States.....	1.16		Average United States.....	54.48

¹ Number of deaths or injuries per million man-hours of exposure.

TABLE 2.—All mines: Number of active mines, men employed, man-days, man-hours of exposure, and number killed and injured, by kind of mine, during the year ended Dec. 31, 1932

Kind of mine	Men employed			Man-days				Man-hours of exposure					
	Num-ber of mines	Under-ground	Sur-face	Open-cut	Total	Under-ground	Sur-face	Open-cut	Total	Under-ground	Sur-face	Open-cut	Total
Copper.....	147	5,441	2,943	1,171	9,555	1,273,440	738,107	259,122	2,290,669	10,153,047	6,382,398	2,072,076	18,608,491
Gold, silver, and miscellaneous metal.....	2,399	13,494	7,287	313	21,094	3,292,902	1,665,521	41,617	5,000,040	26,386,453	13,391,682	377,659	40,855,270
Iron.....	135	6,975	3,372	1,607	11,954	982,597	511,234	281,021	1,774,852	8,242,252	4,959,028	2,749,634	15,008,514
Lead and zinc (Mississippi Valley).....	62	3,420	503	76	3,999	588,076	87,828	6,840	682,744	4,780,688	729,830	24,040	5,531,258
Nonmetallic mineral.....	301	1,991	2,537	2,158	6,686	356,599	644,958	345,305	1,346,862	2,932,961	5,613,818	3,276,114	11,824,883
Total.....	3,044	31,321	16,642	5,325	53,288	6,493,614	3,667,648	933,905	11,095,167	52,475,371	31,051,936	8,511,019	92,038,326

Kind of mine	Average days active			Average hours per man per year			Number killed			Number injured			Rates per million man-hours												
	Under-ground	Open-cut	Total	Under-ground	Sur-face	Total	Under-ground	Sur-face	Total	Under-ground	Sur-face	Total	Orphans	Widows	Under-ground	Sur-face	Total	Under-ground	Sur-face	Total					
																					Under-ground	Open-cut	Total	Under-ground	Open-cut	Total	Under-ground	Open-cut	Total
Copper.....	234	258	221	240	1,866	2,169	1,770	1,948	21	1	23	700	107	52	859	16	2,07	10,16	0,48	1,24	88,94	16,76	25,08	46,16	
Gold, silver, and miscellaneous metal.....	244	229	123	237	956	1,538	207	1,904	52	0	61	2,464	506	18	2,988	32	1,97	67	1,52	83,35	97,79	47,66	74,39		
Iron.....	141	152	175	148	182	1,464	1,690	1,331	5	1	7	204	30	30	264	4	61	20	37	44	24,75	6,08	10,99	16,59	
Lead and zinc (Mississippi Valley).....	172	175	90	171	389	1,443	719	1,383	8	1	9	342	32	1	375	5	11	68	1,38	1,63	71,99	44,08	18,30	67,80	
Nonmetallic mineral.....	179	254	160	201	473	2,214	1,518	1,769	2	5	7	210	172	146	528	5	8	68	89	59	71,60	30,63	44,56	44,65	
Total.....	207	220	175	208	1,866	1,866	1,598	1,727	88	17	2	107	3,920	847	247	5,014	70	1,68	55	23	1,16	74,70	27,28	29,02	54,48

1 Includes fluor spar mines in Illinois and Kentucky.

ACKNOWLEDGMENTS

The facts brought out statistically in this publication are made known through an examination of reports voluntarily furnished by mine-operating companies throughout the country. Were it not for this cooperation of the operators, it would be impossible to obtain comparable records of mine accidents in different States, because of the different bases on which such records are prepared for State purposes. As comparable records are essential to the study of safety in mines and are especially needed when basic mining conditions are similar in many States, special acknowledgment is made to the mining companies whose courtesy in furnishing reports of their operation has made possible the preparation of comparable records of accidents for the entire metal-mining industry.

RELATION OF STATISTICS TO CALENDAR YEAR

This and all other regular statistical reports published by the United States Bureau of Mines relate to calendar years. The data contained in this bulletin are intended to show the number of deaths and injuries resulting from accidents that occurred during the calendar year 1932. While every effort has been made to obtain complete and accurate figures covering accidents at all mines, it is possible that in a few cases the figures cover a fatality in 1932 that resulted from an accident that occurred late in 1931. No such cases, however, are known to the writer.

For accident-prevention studies, accidents should be charged to the year when they occurred, so that they may be studied in connection with the causes and conditions that produced them. The figures in this publication are intended to cover only deaths and injuries that resulted from accidents that occurred in 1932.

SCOPE OF STATISTICS

The tables in this paper are based on reports from 3,044 mines which were operated all or part of the year. Reports for mines in Alaska were furnished by the Territorial mine inspector and those for mines in California by the industrial commission of that State. Reports for all other States were received directly from the operating companies, except those for Arizona and Idaho; these were received from the companies through the offices of the State mine officials of those States. Reports for all States cover mines employing any men, whether producing or nonproducing mines; many prospects are also included. It is believed that the figures published are reasonably complete for the metal-mining industry.

CLASSIFICATION OF MINES

Tables on the following pages are arranged to represent five divisions of the mining industry, as follows:

Copper mines.—This group comprises all of the copper mines reported in operation in which copper was the principal mineral produced.

Gold, silver, and miscellaneous metal mines.—This group comprises gold mines (both lode and placer), silver mines, lead-silver mines, gold-silver mines, lead and zinc mines other than those in the Missis-

ssippi Valley, and mines working ores of quicksilver, manganese, manganiferous iron, tungsten, vanadium, chromium, etc. Pyrite mines are included, as the cinder is used in some metallurgical works for its iron and copper content, and bauxite mines because bauxite is the main source of metallic aluminum.

Iron mines.—All iron mines are included in this group except those whose ores are valuable chiefly for their manganese content.

Lead and zinc mines (Mississippi Valley).—This group comprises the lead and zinc mines of the Mississippi Valley only, but it also includes fluorspar mines in Illinois and Kentucky.

Nonmetallic mineral mines.—The nonmetallic mineral mines include those producing asbestos, asphaltum, barite, borax, emery, feldspar, flint, fluorspar (except in Illinois and Kentucky), garnet, graphite, gypsum, kaolin, lithia, magnesite, mica, mineral paint, phosphate rock, quartz, salt, soapstone, sulphur, talc, and tripoli. Coal mines are not included, and the records do not cover properties that produce stone, clay, or sand and gravel.

CLASSIFICATION OF INJURIES

Statistics of accidents, employment, and mining methods at metal mines and all other mines except coal mines have been compiled by the Bureau of Mines since 1911. From 1911 to 1914, inclusive, the Bureau's classification of nonfatal injuries covered two groups: "Serious" injuries disabling a workman for more than 20 days and "slight" injuries causing disability not exceeding 20 days but longer than the remainder of the day of accident. Beginning with 1915 and continuing through 1929 a "serious" injury, as the term was used in the Bureau's reports, signified a temporary injury disabling an employee more than 14 days. Beginning with 1930 all temporary injuries have been included in a single group, each injury causing disability for more than the remainder of the day on which the accident occurred.

TABLE 3.—All mines: Number of active mines, men employed, and number of man-days, by States, during the year ended Dec. 31, 1932

State	Number of mines	Men employed				Man-days			
		Under ground	Surface	Open-cut	Total	Under-ground	Surface	Open-cut	Total
Alabama.....	12	2, 103	713	72	2, 888	218, 403	78, 395	9, 284	306, 082
Alaska.....	516	983	2, 166	-----	3, 149	264, 072	485, 147	-----	749, 219
Arizona.....	155	2, 496	850	404	3, 750	491, 767	203, 976	77, 636	773, 379
California.....	817	3, 472	1, 957	217	5, 646	779, 624	436, 182	35, 697	1, 251, 503
Colorado.....	217	1, 370	471	50	1, 891	351, 710	117, 960	8, 233	477, 903
Florida.....	11	-----	274	484	758	-----	65, 434	98, 457	163, 941
Georgia.....	17	70	44	168	282	15, 358	12, 964	40, 365	68, 687
Idaho.....	337	2, 398	818	16	3, 232	476, 618	144, 117	1, 795	622, 530
Illinois.....	8	43	14	61	118	5, 687	1, 046	3, 060	9, 793
Iowa.....	8	85	17	21	123	8, 819	1, 862	2, 013	12, 694
Kansas.....	18	568	191	5	764	87, 532	37, 632	750	125, 914
Kentucky.....	13	71	43	245	359	7, 396	4, 248	28, 820	40, 464
Michigan.....	68	4, 284	2, 908	176	7, 368	779, 626	578, 739	24, 842	1, 383, 207
Minnesota.....	62	1, 501	753	1, 257	3, 511	291, 123	158, 680	232, 978	682, 781
Missouri.....	27	1, 751	177	167	2, 095	280, 621	27, 393	24, 119	332, 133
Montana.....	124	1, 830	368	2	2, 200	475, 213	97, 188	120	572, 521
Nevada.....	126	657	418	270	1, 345	158, 294	78, 639	45, 424	282, 357
New Jersey.....	5	541	92	2	635	132, 967	22, 877	360	156, 204
New Mexico.....	44	832	336	274	1, 442	236, 149	73, 084	46, 791	356, 024
New York.....	25	743	202	15	960	129, 570	48, 114	2, 327	180, 011
North Carolina.....	13	91	28	57	176	22, 353	6, 963	11, 310	40, 626

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TABLE 3.—All mines: Number of active mines, men employed, and number of man-days, by States, during the year ended Dec. 31, 1932—Continued

State	Number of mines	Men employed				Man-days			
		Under-ground	Surface	Open-cut	Total	Under-ground	Surface	Open-cut	Total
Oklahoma.....	19	834	80	42	956	144,209	12,744	5,615	162,568
Oregon.....	104	154	180		334	21,663	25,753		47,416
Pennsylvania.....	11	59	89	184	332	5,101	5,875	13,198	24,174
South Dakota.....	22	795	656	22	1,473	258,867	217,378	2,344	478,589
Tennessee.....	13	460	338	298	1,096	101,909	81,209	38,330	221,448
Texas.....	20	128	1,027	82	1,237	35,816	360,764	13,054	409,634
Utah.....	92	1,756	598	357	2,711	486,628	162,795	117,650	767,073
Virginia.....	17	263	381	171	815	43,081	55,386	21,121	119,588
Washington.....	56	183	62	41	286	24,409	8,671	5,177	38,257
Wisconsin.....	7	391	173	5	569	85,169	34,092	1,500	120,761
Wyoming.....	26	24	11	6	41	2,369	727	331	3,427
Other States ¹	34	385	207	154	746	71,491	21,564	21,204	114,259
Total.....	3,044	31,321	16,642	5,325	53,288	6,493,614	3,667,648	933,905	11,095,167

¹ Includes Arkansas, Connecticut, Louisiana, Maine, Maryland, Massachusetts, New Hampshire, Ohio, South Carolina, and Vermont.

TABLE 4.—All mines: Number of man-hours of exposure and average days active, by States, during the year ended Dec. 31, 1932

State	Man-hours of exposure				Average days active				Average hours per man per year				
	Underground	Surface	Open-cut	Total	Underground	Surface	Open-cut	Total	Underground	Surface	Open-cut	Total	
Alabama.....	2,122,576	755,050	90,427	2,968,053	104	110	129	106	1,009	1,059	1,256	1,028	
Alaska.....	2,112,576	3,881,176		5,993,752	269	224		238	2,149	1,792		1,903	
Arizona.....	3,929,722	1,631,204	620,908	6,181,834	190	202	162	206	1,574	1,919	1,537	1,648	
California.....	6,238,993	3,627,052	285,910	10,051,955	225	223	165	222	1,797	1,802	1,318	1,780	
Colorado.....	2,813,085	942,113	67,370	3,822,568	257	250	165	253	2,053	2,000	1,347	2,021	
Florida.....		604,607	957,027	1,561,634			239	203	216		2,207	1,977	2,060
Georgia.....	153,580	114,640	418,652	686,872	219	295	240	244	2,194	2,605	2,492	2,436	
Idaho.....	3,814,897	1,158,572	15,960	4,989,429	109	176	112	103	1,591	1,416	998	1,544	
Illinois.....	47,900	8,368	24,400	80,668	132	75	50	83	1,114	598	400	684	
Iowa.....	69,807	14,628	16,100	100,535	104	110	96	103	821	860	767	817	
Kansas.....	740,780	341,658	6,000	1,088,418	154	197	150	165	1,304	1,789	1,200	1,425	
Kentucky.....	62,810	38,482	288,197	389,489	104	99	118	113	885	895	1,176	1,085	
Michigan.....	6,184,185	5,305,229	218,511	11,707,925	182	199	141	188	1,444	1,824	1,242	1,589	
Minnesota.....	2,354,029	1,578,769	2,325,938	6,258,736	194	211	185	194	1,568	2,097	1,850	1,783	
Missouri.....	2,244,880	218,942	197,135	2,660,957	160	155	144	159	1,282	1,237	1,180	1,270	
Montana.....	3,799,286	777,494	960	4,577,740	260	264	60	260	2,076	2,113	480	2,081	
Nevada.....	1,265,150	635,242	363,395	2,263,787	241	188	168	210	1,926	1,520	1,346	1,683	
New Jersey.....	1,063,909	183,021	2,880	1,249,810	246	249	180	246	1,967	1,989	1,440	1,968	
New Mexico.....	1,855,678	586,672	374,328	2,816,678	284	218	171	247	2,230	1,746	1,366	1,953	
New York.....	1,010,669	409,061	21,906	1,441,636	174	238	155	188	1,360	2,025	1,460	1,502	
North Carolina.....	208,413	59,824	113,100	381,337	246	249	198	231	2,290	1,137	1,984	2,167	
Oklahoma.....	1,160,101	104,367	46,644	1,311,112	173	159	134	170	1,391	1,305	1,111	1,371	
Oregon.....	176,375	212,021		388,396	141	143		142	1,145	1,178		1,163	
Pennsylvania.....	44,800	55,929	126,716	227,445	86	66	72	73	759	628	689	685	
South Dakota.....	2,070,936	1,739,020	19,098	3,829,054	326	331	107	325	2,605	2,651	868	2,599	
Tennessee.....	824,568	744,198	375,740	1,944,506	222	240	129	202	1,793	2,202	1,261	1,774	
Texas.....	286,926	2,934,052	120,048	3,341,026	280	351	159	331	2,242	2,857	1,464	2,701	
Utah.....	3,894,813	1,311,437	941,200	6,147,450	277	272	330	283	2,218	2,193	2,636	2,268	
Virginia.....	345,374	606,792	213,845	1,166,011	164	145	124	147	1,313	1,593	1,251	1,431	
Washington.....	194,397	70,263	41,416	306,076	133	140	126	134	1,062	1,133	1,010	1,070	
Wisconsin.....	724,430	310,364	12,000	1,046,794	218	197	300	212	1,853	1,794	2,400	1,840	
Wyoming.....	18,702	5,566	3,115	27,383	96	66	55	84	779	506	519	668	
Other States ¹	641,045	186,123	202,093	1,029,261	186	104	138	153	1,665	899	1,312	1,380	
Total.....	52,475,371	31,051,936	8,511,019	92,038,326	207	220	175	208	1,675	1,866	1,598	1,727	

¹ Includes Arkansas, Connecticut, Louisiana, Maine, Maryland, Massachusetts, New Hampshire, Ohio, South Carolina, and Vermont.

TABLE 5.—All mines: Fatalities and injuries and rates per million man-hours, by States, during the year ended Dec. 31, 1932

State	Number killed			Number injured (time lost, 1 day or more)				Widows	Orphans	Rates per million man-hours								
	Underground	Surface	Open-cut	Total	Underground	Surface	Open-cut			Total	Killed				Injured			
											Underground	Surface	Open-cut	Total	Underground	Surface	Open-cut	Total
Alabama	2			2	53	5	13	71		0.94			0.67	24.97	6.62	143.76	23.92	
Alaska	5			5	114	100		214		2.37			1.83	53.96	25.77		35.70	
Arizona	8	1		9	252	34	14	300	4	3.04	0.61		1.46	64.13	20.84	22.55	48.53	
California	21	4		25	753	161	15	929	10	13.37	1.13		2.49	120.69	45.65	52.46	92.42	
Colorado	8	3		11	357	54	9	420	5	7.84	3.18		2.88	126.91	57.32	133.59	109.87	
Florida		1		1		20	28	48	1	2	1.65			.64		33.08	29.26	
Georgia					5	4	8	17						32.56	34.89	19.11	24.75	
Idaho	9			9	329	73	1	403	5	2.36			1.80	86.24	63.01	62.66	80.77	
Illinois					55		1	6						104.38		40.98	74.38	
Iowa					7	1		8						100.28	68.36		79.57	
Kansas	4			4	66	11		66	2	1.50			3.68	74.25	32.20		60.64	
Kentucky					1		20	21						15.92		69.40	53.92	
Michigan	5			5	292	32	3	327	5	16	81		.43	47.22	6.03	13.73	27.93	
Minnesota	1	1		2	50	13	25	88	2	6	42	.63	.32	21.24	8.23	10.75	14.06	
Missouri	2		1	3	121	1	9	131	1	1	89	5.07	1.13	53.90	4.57	45.65	49.23	
Montana	8			8	240	35		275		2	1.11		1.75	63.17	45.02		60.07	
Nevada	2			2	88	15	19	122	1	5	1.58		.88	69.56	23.61	52.28	53.89	
New Jersey	1			1	51	3		54	1	1	.94		.80	47.94	16.39		43.21	
New Mexico	1			1	115	20	18	153			.54		.36	61.97	34.09	48.09	54.32	
New York	1	1		2	36	3	1	40	1		.99	2.44	1.39	35.62	7.33	45.65	27.75	
North Carolina					9	4	3	16						43.18	66.86	26.53	41.96	
Oklahoma	1	1		2	153	12	2	167	2	3	86	9.58	1.53	131.89	114.98	42.88	127.37	
Oregon					4	13		17						22.68	61.31		43.77	
Pennsylvania					146	37		183						70.50	21.28		47.79	
South Dakota					16	26	11	53	1		2.43		1.03	19.40	34.94	29.28	27.26	
Tennessee	2			2	14	92	8	114	1	3		.68	.60	48.79	31.36	66.64	34.12	
Texas	6	2	1	9	540	40	3	583	4	6	1.54	1.53	1.46	138.65	30.50	3.19	94.84	
Utah		1		1	20	23	8	51	1	1		1.65	.86	57.91	37.90	37.41	43.74	
Virginia					11	5		16			5.14		3.27	56.59	71.16		52.27	
Washington	1			1	46	7	3	56						63.50	22.55	250.00	53.50	
Wisconsin																		
Wyoming																		
Other States ¹					37	3	25	65						57.72	16.12	123.71	63.15	
Total	88	17	2	107	3,920	847	247	5,014	47	70	1.68	.55	.23	1.16	74.70	27.28	29.02	54.48

¹ Includes Arkansas, Connecticut, Louisiana, Maine, Maryland, Massachusetts, New Hampshire, Ohio, South Carolina, and Vermont.

TABLE 6.—All mines: Fatalities, by causes and States, during the year ended Dec. 31, 1932

State ¹	Underground													Shaft											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15a	15b	Total, underground	16	17	18	19	20	21	Total, shaft	
	Fall of rock or ore from roof or wall	Rock or ore while loading at working face	Hand tools	Explosives	Haulage	Falling down raise, winze, chute, or slope	Run of ore from chute or pocket	Drilling	Electricity	Machinery	Mine fires	Suffocation from natural gases	Inrush of water	Stepping on nail	Handling materials (other than rock or ore)	Other causes	Total, underground	Falling down shaft	Objects falling down shaft	Breaking of cables	Overwinding	Skip, cage, or bucket	Other causes	Total, shaft	
Alabama.....																									
Alaska.....				1	1	3									1		2								1
Arizona.....				2		1											4					1	3		5
California.....				9		1											3					2	3		4
Colorado.....	3					2											7					2			1
Florida.....					1	1	1										1								
Idaho.....	7			2													9								1
Michigan.....	3			1													4					1			1
Minnesota.....	1																1								
Missouri.....				2													2								
Montana.....				1	2												1								1
Nevada.....	2																1								2
New Mexico.....	1					1				1							1								
New York.....																	1								
Oklahoma.....	1																1								
Texas.....																	1								
Utah.....																	5								1
Virginia.....	4																1								
Washington.....																	1								
Other States ¹	2					8	1		2	2		5			1	1	4		1			1			3
Total.....	27			19	4	8	1		2	2	5				1	1	70	3	2	1		8	4	18	

¹ Includes Kansas, New Jersey, and Tennessee.

TABLE 6.—All mines: Fatalities, by causes and States, during the year ended Dec. 31, 1932—Continued

State	Surface										Open-cut										Grand total				
	Mine cars, mine locomotives, or aerial trams	Railway cars and locomotives	Run or fall of ore bins	Falls of persons	Stepping on nail	Hand tools	Electricity	Machinery	Handling mate-rials	Other causes	Total, surface	Falls or slides of rock or ore	Explosives	Haulage	Power shovels	Falls of persons	Falls of derricks, booms, etc.	Run or fall of ore bins	Machinery	Electricity		Hand tools	Handling mate-rials	Other causes	Total, open-cut
	22	23	24	25	26	27	28	29	30a	30b	31	32	33	34	35	36	37	38	39	40	41a	41b			
Alabama.....																									
Alaska.....																									
Arizona.....				1																					
California.....							2																		
Colorado.....									1	2															
Florida.....																									
Idaho.....																									
Michigan.....																									
Minnesota.....																									
Missouri.....											1														
Montana.....																									
Nevada.....																									
New Mexico.....																									
New York.....																									
Oklahoma.....																									
Texas.....																									
Utah.....																									
Virginia.....																									
Washington.....																									
Other States ¹																									
Total.....	2	2		2	1	4	4	2	2	17	1	1												2	107

¹ Includes Kansas, New Jersey, and Tennessee.

TABLE 7.—All mines: Injuries, by causes and States, during the year ended Dec. 31, 1932

State	Underground															Shaft										
	Fall of rock or ore from roof or wall	Hook or ore while loading at working face	Hand tools	Explosives	Haulage	Falling down chute, or slope, raise, or stope	Run of ore from chute or pocket	Drilling	Electricity	Machinery	Mine fires	Suffocation from natural gases	Inrush of water	Stepping on nail	Handling materials (other than rock or ore)	Other causes	Total, underground	Falling down shaft	Objects falling down shaft	Breaking of cables	Overwinding	Skip, cage, or bucket	Other causes	Total, shaft		
Alabama.....	5	8	2	3	4	5	6	7	8	9	10	11	12	13	14	15a	15b	2	50	16	17	18	19	20	21	3
Alaska.....	4	6	2	1	13	1	1	1	3	2	2	2	2	2	2	13	2	2	1	1	1	1	1	3	3	3
Arizona.....	60	17	19	3	20	14	2	24	4	1	1	1	1	1	2	23	35	109	1	2	2	5	3	7	5	
California.....	129	78	81	24	89	65	21	73	4	13	4	2	2	1	12	68	68	242	3	6	3	10	15	7	10	
Colorado.....	80	37	22	5	33	20	11	41	3	8	1	2	1	3	19	71	564	1	1	1	1	1	1	1	25	
Florida.....	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	5	1	1	1	1	1	1	3	
Georgia.....	69	39	37	1	28	10	5	27	3	3	3	1	1	1	15	29	40	307	6	6	4	12	4	12	22	
Idaho.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	6	1	1	1	1	1	1	1	
Illinois.....	4	16	3	4	4	3	1	1	2	1	1	1	1	1	3	13	2	6	1	1	1	1	1	1	4	
Iowa.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	
Kansas.....	4	16	3	4	4	3	1	1	2	1	1	1	1	1	3	13	2	6	1	1	1	1	1	1	4	
Kentucky.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	
Michigan.....	52	38	12	10	22	22	1	12	9	9	9	2	2	1	16	75	268	1	5	6	3	10	3	10	24	
Minnesota.....	15	1	2	1	9	5	1	12	2	4	5	1	1	1	8	5	49	5	1	1	1	1	1	1	2	
Missouri.....	15	26	6	1	23	9	2	13	1	1	1	1	1	1	10	119	10	119	1	3	2	2	2	2	11	
Montana.....	57	19	60	4	30	9	2	13	1	1	1	1	1	1	16	139	229	1	3	1	1	2	2	5	11	
Nebraska.....	21	7	4	1	13	5	4	13	1	1	1	1	1	1	8	12	87	1	1	1	1	1	1	1	1	
Nevada.....	7	13	8	1	1	2	3	6	1	1	1	1	1	1	1	1	8	51	1	1	1	1	1	1	1	
New Jersey.....	30	17	29	1	9	3	1	10	1	1	1	1	1	1	6	9	9	115	1	1	1	1	1	1	1	
New Mexico.....	5	10	7	1	4	3	1	2	2	2	2	1	1	1	1	1	2	36	1	1	1	1	1	1	1	
New York.....	5	10	7	1	4	3	1	2	2	2	2	1	1	1	1	1	9	36	1	1	1	1	1	1	1	
North Carolina.....	8	38	2	3	33	1	1	15	4	4	4	1	1	1	6	39	149	1	4	4	1	1	1	1	4	
Oklahoma.....	3	3	2	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Oregon.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Pennsylvania.....	18	21	1	1	1	2	1	12	2	2	2	1	1	1	1	87	145	1	2	1	1	1	1	1	3	
South Dakota.....	1	1	1	1	1	1	1	3	3	3	3	1	1	1	1	1	3	13	1	1	1	1	1	1	1	
Tennessee.....	7	1	1	1	1	1	1	3	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Texas.....	117	44	38	2	85	27	4	55	5	10	10	3	3	6	55	74	525	2	1	1	2	9	9	3	15	
Utah.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Virginia.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Washington.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Wisconsin.....	13	6	4	4	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Wyoming.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Other States ¹	3	1	1	1	3	3	3	6	3	3	3	1	1	1	1	1	15	33	1	1	1	1	1	1	4	
Total.....	728	460	352	63	436	204	99	351	16	68	1	8	1	52	272	667	3,778	13	37	13	47	45	47	45	142	

¹ Includes Arkansas, Connecticut, Louisiana, Maine, Maryland, Massachusetts, New Hampshire, New Mexico, North Carolina, and Vermont.

TABLE 7.—All mines: Injuries, by causes and States, during the year ended Dec. 31, 1932—Continued

State	Surface										Open-cut										Grand total					
	Mine cars, mine aerial trams, or locomotives	Railway cars and locomotives	Run or fall of ore in or from ore bins	Falls of persons	Stepping on nail	Hand tools	Electricity	Machinery	Handling mate-trails	Other causes	Total, surface	Falls or slides of rock or ore	Explosives	Haulage	Power shovels	Falls of persons	Falls of derricks, booms, etc.	Run or fall of ore in or from ore bins	Machinery	Electricity		Hand tools	Handling mate-trails	Other causes	Total, open-cut	
Alabama	22	23	24	25	26	27	28	29	30a	30b	31	32	33	34	35	36	37	38	39	40	41a	41b	42	43	71	
Alaska	2	1	3	25	6	17	4	4	2	47	1										12				13	
Arizona	2	1	4	6	2	6	4	4	7	34	2	1	2	2	2						4	1	1	1	14	
California	2	1	4	31	2	21	2	25	35	38	4	4	2	4	4			1	1	2	2	5	5	15	929	
Colorado	13	1	2	1	1	3	2	6	16	12	4	4	1	1	2						4	4	1	1	9	
Florida	1			1		3	2	5	9	20	1		1	1	2			2	2	2	7	13	3	3	28	
Georgia	1			1		1		6	1	4	1									1	2	3	3	8	48	
Idaho	5		1	16	1	5		6	21	18	1														17	
Illinois																										403
Iowa																										1
Kansas				1	1	4			4	1	11															8
Kentucky				1	1	4																				66
Kentucky				1	1	4																				21
Michigan	1	1	1	6	1	7		5	2	8	32		2	2	1		2				6	7	20	3	327	
Minnesota				1	1	1		2	1	3	13		4	4	3		3				1	6	3	25	88	
Missouri				1	1	1		2	1	1	1		2	2	1		1				1	1	4	9	131	
Missouri				1	1	1		2	1	1	1		2	2	1		1				1	1	4	9	131	
Montana	6		2	8	1	12		1	1	35																275
Nevada			1	1	1	1	2	1	1	5	15		3	3	2		1				2	6	1	1	19	
New Jersey			2	1	1	2	1	2	2	9	20		1	1	1		1				2	1	5	18	54	
New Mexico	3	2		1	1	1		1	1	1	3		1	1	1		3				2	1	5	18	153	
New York				1	1	1		1	1	4	3		1	1	1		1				2	1	5	18	40	
New York				1	1	1		1	1	4	3		1	1	1		1				2	1	5	18	40	
North Carolina				1	1	1		3	1	3	4		1	1	1		4				2	2	3	3	16	
North Carolina				1	1	1		3	1	3	4		1	1	1		4				2	2	3	3	16	
Oklahoma				1	1	1		3	1	6	12		1	1	1		1									167
Oregon				1	1	1		1	3	6	13															17
Pennsylvania				1	1	1		1	3	6	13															183
South Dakota				1	1	1		1	3	6	13															183
Tennessee	1	2	2	5	1	4		5	10	26	1															53
Texas	1	2	2	8	4	10		12	25	28	92	3	1	2	4						1	1	3	11	114	
Utah	3	3	3	9	1	3		3	8	10	40										1	1	1	1	8	
Virginia	5	2		6	1	1		6	1	9	23		1	1	1						3	3	3	3	583	
Washington				1	1	1		2	2	4	7															16
Wisconsin				1	1	1		2	2	4	7															56
Wyoming				1	1	1		2	2	4	7															65
Other States ¹				1	1	1		2	2	4	7															65
Total	41	10	17	139	20	112	7	87	151	263	847	35	2	20	18	18	1	1	15	3	22	54	58	247	5,014	

¹ Includes Arkansas, Connecticut, Louisiana, Maine, Maryland, Massachusetts, New Hampshire, Ohio, South Carolina, and Vermont.

12 METAL-MINE ACCIDENTS IN THE UNITED STATES: 1932

TABLE 8.—All mines: Accidents, by States and severity of injury, during the year ended Dec. 31, 1932

State	Killed	Nonfatal			Total non-fatal	Grand total
		Perma- nent total ¹	Perma- nent partial ²	Tempo- rary ³		
Alabama.....	2	1	12	58	71	73
Alaska.....	5		5	209	214	219
Arizona.....	9		11	289	300	309
California.....	25		18	911	929	954
Colorado.....	11	1	11	408	420	431
Florida.....	1		1	47	48	49
Georgia.....				17	17	17
Idaho.....	9		19	384	403	412
Illinois.....				6	6	6
Iowa.....			1	7	8	8
Kansas.....	4		1	65	66	70
Kentucky.....				21	21	21
Michigan.....	5		8	319	327	332
Minnesota.....	2		8	80	88	90
Missouri.....	3		15	116	131	134
Montana.....	8			275	275	283
Nevada.....	2		5	117	122	124
New Jersey.....	1		8	46	54	55
New Mexico.....	1	1	5	147	153	154
New York.....	2			40	40	42
North Carolina.....				16	16	16
Oklahoma.....	2		6	161	167	169
Oregon.....				17	17	17
Pennsylvania.....						
South Dakota.....		1	4	178	183	183
Tennessee.....	2		2	51	53	55
Texas.....	2		4	110	114	116
Utah.....	9	4	18	561	583	592
Virginia.....	1		3	48	51	52
Washington.....	1		1	15	16	17
Wisconsin.....		2		54	56	56
Wyoming.....						
Other States ⁴			1	64	65	65
Total.....	107	10	167	4,837	5,014	5,121

¹ Permanent total disability: Loss of both legs or arms, 1 leg and 1 arm, total loss of eyesight, paralysis, or other condition permanently incapacitating workmen from doing any work of a gainful occupation.

² Permanent partial disability: Loss of 1 foot, leg, arm, hand, eye, 1 or more fingers, 1 or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.

³ Disability for more than the remainder of day of accident.

⁴ Includes Arkansas, Connecticut, Louisiana, Maine, Maryland, Massachusetts, New Hampshire, Ohio, South Carolina, and Vermont.

TABLE 9.—All mines: Accidents, by causes and severity of injury, during the year ended Dec. 31, 1932

Cause of accident	Killed	Nonfatal				Grand total
		Perma- nent total ¹	Perma- nent partial ²	Tempo- rary ³	Total nonfatal	
Underground:						
1. Fall of rock or ore from roof or wall.....	27	1	28	699	728	755
2. Rock or ore while loading at working face.....			5	455	460	460
3. Hand tools.....			7	345	352	352
4. Explosives.....	19		12	51	63	82
5. Haulage.....	4	2	25	409	436	440
6. Falling down chute, winze, raise, or slope.....	8		6	198	204	212
7. Run of ore from chute or pocket.....	1		1	98	99	100
8. Drilling.....		1	9	341	351	351
9. Electricity.....	2			16	16	18
10. Machinery.....	2	1	8	59	68	70
11. Mine fires.....				1	1	1
12. Suffocation from natural gases.....	5			8	8	13
13. Inrush of water.....				1	1	1
14. Stepping on nail.....			1	51	52	52
15a. Handling materials (other than rock or ore).....	1	1	6	265	272	273
15b. Other causes.....	1	2	13	652	667	668
Total, underground.....	70	8	121	3,649	3,778	3,848
Shaft:						
16. Falling down shaft.....	3			13	13	16
17. Objects falling down shaft.....	2		1	36	37	39
18. Breaking of cables.....	1					1
19. Overwinding.....						
20. Skip, cage, or bucket.....	8	1	3	43	47	55
21. Other causes.....	4		2	43	45	49
Total, shaft.....	18	1	6	135	142	160
Surface:						
22. Mine cars, mine locomotives, grav- ity or aerial trams.....	2			41	41	43
23. Railway cars and locomotives.....	2		4	6	10	12
24. Run or fall of ore in or from ore bins.....				17	17	17
25. Falls of persons.....	2		4	135	139	141
26. Stepping on nail.....	1			20	20	21
27. Hand tools.....			5	107	112	112
28. Electricity.....	4		1	6	7	11
29. Machinery.....	2		11	76	87	89
30a. Handling materials.....	2		4	147	151	153
30b. Other causes.....	2		4	259	263	265
Total, surface.....	17		33	814	847	864
Open-cut:						
31. Falls or slides of rock or ore.....	1	1	1	33	35	36
32. Explosives.....	1		1	1	2	3
33. Haulage.....				20	20	20
34. Power shovels.....			1	17	18	18
35. Falls of persons.....			1	17	18	18
36. Falls of derricks, booms, etc.....				1	1	1
37. Run or fall of ore in or from ore bins.....				1	1	1
38. Machinery.....			1	14	15	15
39. Electricity.....				3	3	3
40. Hand tools.....				22	22	22
41a. Handling materials.....			1	53	54	54
41b. Other causes.....			1	57	58	58
Total, open-cut.....	2	1	7	239	247	249
Grand total.....	107	10	167	4,837	5,014	5,121

¹ Permanent total disability: Loss of both legs or arms, 1 leg and one arm, total loss of eyesight, paralysis, or other condition permanently incapacitating workman from doing any work of a gainful occupation.

² Permanent partial disability: Loss of 1 foot, leg, hand, eye, 1 or more fingers, 1 or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.

³ Disability for more than the remainder of day of accident.

TABLE 10.—All mines: Causes of fatalities and injuries, showing percentage due to each cause and corresponding rates per million man-hours during the year ended Dec. 31, 1932

Cause of accident	Number killed				Number injured			
	Percent of—		Per million man-hours		Percent of—		Per million man-hours	
	Grand total	Class total	Grand total	Class total	Grand total	Class total	Grand total	Class total
Underground:								
1. Fall of rock or ore from roof or wall.....	25.23	38.57	0.29	0.51	14.52	19.27	7.91	13.87
2. Rock or ore while loading at working face.....					9.17	12.17	5.00	8.77
3. Hand tools.....					7.02	9.32	3.82	6.71
4. Explosives.....	17.76	27.14	.21	.36	1.26	1.67	.68	1.20
5. Haulage.....	3.74	5.71	.05	.07	8.70	11.54	4.74	8.31
6. Falling down chute, winze, raise, or stope.....	7.48	11.43	.09	.15	4.07	5.40	2.22	3.89
7. Run of ore from chute or pocket.....	.93	1.43	.01	.02	1.97	2.62	1.08	1.89
8. Drilling.....					7.00	9.29	3.81	6.69
9. Electricity.....	1.87	2.86	.02	.04	.32	.42	.17	.30
10. Machinery.....	1.87	2.86	.02	.04	1.36	1.80	.74	1.30
11. Mine fires.....					.02	.03	.01	.02
12. Suffocation from natural gases.....	4.68	7.14	.05	.10	.16	.21	.09	.15
13. Inrush of water.....					.02	.03	.01	.02
14. Stepping on nail.....					1.04	1.38	.56	.99
15a. Handling materials other than rock or ore.....	.93	1.43	.01	.02	5.42	7.20	2.96	5.18
15b. Other causes.....	.93	1.43	.01	.02	13.30	17.65	7.25	12.71
Total, underground.....	65.42	100.00	.76	1.33	75.35	100.00	41.05	72.00
Shaft:								
16. Falling down shaft.....	2.80	16.67	.03	.06	.26	9.15	.14	.25
17. Objects falling down shaft.....	1.87	11.11	.02	.04	.74	26.06	.40	.70
18. Breaking of cables.....	.93	5.56	.01	.02				
19. Overwinding.....								
20. Skip, cage, or bucket.....	7.48	44.44	.09	.15	.93	33.10	.51	.90
21. Other causes.....	3.74	22.22	.05	.07	.90	31.69	.49	.86
Total, shaft.....	16.82	100.00	.20	.34	2.83	100.00	1.54	2.71
Surface:								
22. Mine cars, mine locomotives, gravity or aerial trams.....	1.87	11.76	.02	.06	.82	4.84	.44	1.32
23. Railway cars and locomotives.....	1.87	11.76	.02	.06	.20	1.18	.11	.32
24. Run or fall of ore in or from ore bins.....					.34	2.01	.18	.55
25. Falls of persons.....	1.87	11.76	.02	.06	2.77	16.41	1.51	4.48
26. Stepping on nail.....	.93	5.89	.01	.03	.40	2.36	.22	.64
27. Hand tools.....					2.23	13.22	1.22	3.61
28. Electricity.....	3.74	23.53	.05	.13	.14	.83	.08	.23
29. Machinery.....	1.87	11.76	.02	.06	1.73	10.27	.94	2.80
30a. Handling materials.....	1.87	11.76	.02	.06	3.01	17.83	1.64	4.86
30b. Other causes.....	1.87	11.76	.02	.06	5.25	31.05	2.86	8.47
Total, surface.....	15.89	100.00	.18	.56	16.89	100.00	9.20	27.28
Open-cut:								
31. Falls or slides of rock or ore.....	.93	50.00	.01	.12	.70	14.17	.38	4.11
32. Explosives.....	.93	50.00	.01	.12	.04	.81	.02	.23
33. Haulage.....					.40	8.10	.22	2.35
34. Power shovels.....					.36	7.29	.20	2.11
35. Falls of persons.....					.36	7.29	.20	2.11
36. Falls of derricks, booms, etc.....					.02	.40	.01	.12
37. Run or fall of ore in or from ore bins.....					.02	.40	.01	.12
38. Machinery.....					.30	6.07	.16	1.76
39. Electricity.....					.06	1.22	.03	.35
40. Hand tools.....					.44	8.91	.24	2.58
41a. Handling materials.....					1.08	21.86	.59	6.34
41b. Other causes.....					1.15	23.48	.63	6.81
Total, open-cut.....	1.87	100.00	.02	.23	4.93	100.00	2.69	29.02
Grand total.....	100.00		1.16		100.00		54.48	

CLASSIFICATION OF ACCIDENTS BY KIND OF MINE

Copper mines.—The fatality rate for copper mines in 1932 was the same as in 1931—1.24 per million man-hours of exposure. However, the nonfatal-injury rate showed a decided and gratifying decline (from 62.90 to 46.16). The number of men employed fell from 19,687 to 9,555; and the amount of labor performed, which represents the period during which the employees were exposed to the hazards of their occupations, was only 18,608,421 man-hours, 55 percent less than in 1931. The average employee in 1932 worked 240 shifts or 1,948 hours, compared with 258 shifts or 2,084 hours in 1931. Accidents resulted in 23 deaths and 859 nonfatal injuries that disabled the employee for more than the remainder of the day on which the accident occurred.

Michigan, Arizona, Montana, and Utah reported the largest number of man-hours of work done. Michigan and Montana reduced their accident-frequency rates covering fatalities and injuries at copper mines, while the corresponding rate for Utah was slightly higher than in 1931. In spite of this increase, however, the rate for Utah was still much lower than that for the other three States due largely to the fact that copper mining in Utah is conducted chiefly by open-cut mining methods which usually are less hazardous than underground work. The comparative accident-frequency rates per million man-hours of exposure in 1931 and 1932 for the four States named was as follows:

	1931	1932
Michigan.....	71.1	37.8
Arizona.....	52.1	52.1
Montana.....	76.4	65.1
Utah.....	15.7	17.4

Gold, silver, and miscellaneous metal mines.—The combined fatality rate for mines included in this group was higher than in 1931 but the rate for nonfatal injuries was reduced. Figures compiled from operators' reports showed a fatality rate of 1.52 and an injury rate of 74.39, the corresponding rates for 1931 being 1.19 and 78.65, respectively. The number of men employed declined from 24,343 to 21,094, with an aggregate working time of 40,165,270 man-hours in 1932, a reduction of 17 percent. Sixty-one deaths and 2,988 nonfatal lost-time injuries were reported. The average period of employment per man was 237 days or 1,904 hours compared with 248 days or 1,998 hours in the preceding year.

The four leading States according to the number of men employed in 1932, were California Idaho, Alaska, and Utah. The accident rate for the last-named State remained unchanged from the preceding year; that for Idaho increased, while the rates for Alaska and Cali-

ifornia were reduced. Comparative rates per million man-hours of exposure for this class of mines in the four States were as follows:

	1931	1932
California.....	107.3	96.2
Idaho.....	76.0	82.6
Alaska.....	37.1	33.8
Utah.....	125.8	125.5

Iron mines.—Accident prevention in mining has perhaps advanced further at iron-ore mines than at any other major class of metal mines. In 1932 the fatality rate per million man-hours of exposure was only 0.44 and the rate for nonfatal injuries only 16.59. These are unusually favorable rates for mining, and both represent further reductions from the favorable rates for iron mining that prevailed in 1931. The average period of operation of the mines was 148 days or 1,331 hours compared with 202 days or 1,796 hours in 1931. The average number of men working during 1932 was 11,954 compared with 21,786 in 1931. A reduction of 59 percent was reported in the total volume of employment as measured by the number of man-hours worked during the year. Accidents at the mines resulted in 7 deaths and 264 nonfatal lost-time injuries, the causes of which are shown in table 21.

Michigan, Minnesota, and Alabama led all other States in the number of men engaged in mining iron ore. Comparative accidents rates for iron-ore mining in these States are given below:

	1931	1932
Alabama.....	21.9	21.3
Michigan.....	16.4	17.1
Minnesota.....	12.0	14.3

TABLE 11.—Copper mines: Men employed and man-days, by States, during the year ended Dec. 31, 1932

State	Number of mines	Men employed				Man-days				Average days active			
		Under-ground	Surface	Open-cut	Total	Under-ground	Surface	Open-cut	Total	Under-ground	Surface	Open-cut	Total
Arizona.....	46	2,088	708	381	3,177	416,154	181,466	74,035	671,655	199	256	194	211
Idaho.....	8	17	6	3	26	2,119	1,042	400	3,561	125	174	133	137
Michigan.....	9	1,283	1,208	3	2,491	359,397	335,414	---	694,811	280	278	---	279
Montana.....	27	1,461	262	---	1,723	398,169	76,145	---	474,314	273	291	---	275
Nevada.....	11	112	284	236	632	24,145	51,219	40,374	115,738	216	180	171	183
New Mexico.....	9	134	190	249	573	19,085	31,526	44,664	95,275	142	166	179	166
Oregon.....	3	14	2	---	16	2,868	730	---	3,598	205	365	---	225
Utah.....	10	35	178	302	515	7,226	58,334	99,649	165,209	206	328	380	321
Washington.....	9	23	15	---	38	1,770	2,495	---	4,265	77	166	---	112
Other States ¹	15	274	90	---	364	42,507	19,736	---	62,243	155	219	---	171
Total.....	147	5,441	2,943	1,171	9,555	1,273,440	758,107	259,122	2,290,669	234	258	221	240

¹ Includes Alaska, California, Colorado, North Carolina, Tennessee, and Wyoming.

TABLE 12.—Copper mines: Number of man-hours of exposure and number killed and injured, by States, during the year ended Dec. 31, 1932

State	Man-hours of exposure			Average hours per man per year			Number killed				Number injured				Wid-ows	Or-phans
	Under-ground	Surface	Open-cut	Under-ground	Surface	Open-cut	Under-ground	Sur-face	Open-cut	Total	Under-ground	Sur-face	Open-cut	Total		
Arizona.....	3,329,228	1,450,728	592,280	1,594	2,049	1,555	1,691	7	31	14	228	31	14	273	4	3
Idaho.....	17,872	8,335	3,200	1,051	1,389	1,067	1,131	1	1	---	196	20	---	219	1	13
Michigan.....	2,875,172	3,001,679	3,200	2,241	2,485	2,359	2,359	3	3	---	213	26	---	239	3	---
Montana.....	3,185,352	609,160	322,992	2,180	2,325	2,202	2,202	8	8	---	11	7	---	18	---	---
Nebraska.....	191,960	409,752	357,312	1,714	1,443	1,369	1,463	1	1	---	11	7	---	18	---	---
New Mexico.....	117,970	252,208	337,312	880	1,327	1,435	1,270	1	1	---	1	9	---	34	---	---
Oregon.....	22,944	5,540	797,192	1,652	2,920	2,640	2,566	1	1	---	17	2	---	21	---	---
Utah.....	57,808	466,672	34,820	1,638	1,842	1,770	1,868	1	1	---	22	12	---	34	---	---
Washington.....	14,685	157,888	---	1,241	1,754	---	1,368	---	---	---	---	---	---	---	---	---
Other States ¹	340,056	157,888	---	1,241	1,754	---	1,368	---	---	---	---	---	---	---	---	---
Total.....	10,153,047	6,382,398	2,072,976	1,866	2,169	1,770	1,948	21	1	1	700	107	52	859	9	16

¹ Includes Alaska, California, Colorado, North Carolina, Tennessee, and Wyoming.

TABLE 13.—Gold, silver, and miscellaneous metal mines: Men employed and man-days, by States, during the year ended Dec. 31, 1932

State	Number of mines	Men employed				Man-days				Average days active			
		Under-ground	Surface	Open-cut	Total	Under-ground	Surface	Open-cut	Total	Under-ground	Surface	Open-cut	Total
Alaska.....	509	945	2,147	16	3,092	255,262	480,576	---	735,838	270	224	---	238
Arizona.....	103	344	140	---	500	64,210	22,360	13,247	88,734	187	160	135	177
California.....	755	3,130	1,888	77	5,104	722,575	422,153	13,247	1,157,975	230	224	173	227
Colorado.....	191	1,330	462	23	1,815	347,451	116,505	5,027	468,983	261	252	219	258
Idaho.....	324	2,318	802	13	3,133	462,059	140,820	1,395	604,274	199	176	107	193
Montana.....	91	333	105	2	438	68,063	20,735	1,120	88,918	206	197	60	203
Nebraska.....	106	524	124	6	654	129,366	25,288	600	155,254	247	204	100	237
Nevada.....	29	681	146	5	832	215,439	41,588	180	267,147	316	285	80	309
New Mexico.....	101	140	178	---	318	18,795	25,023	---	43,818	134	141	---	138
Oregon.....	16	788	656	---	1,446	256,767	217,378	180	474,325	326	331	90	328
South Dakota.....	69	1,625	375	4	2,004	461,006	94,956	633	556,905	284	263	158	278
Utah.....	6	182	30	18	230	31,471	6,353	2,209	40,633	173	212	123	174
Virginia.....	21	154	11	13	198	21,691	4,160	1,925	28,016	142	134	148	141
Washington.....	44	20	11	2	33	1,919	4,727	1,652	2,698	96	66	26	82
Wyoming.....	21	973	192	132	1,297	236,888	46,929	13,915	297,432	243	244	105	229
Other States ¹	34	---	---	---	---	---	---	---	---	---	---	---	---
Total.....	2,399	13,494	7,287	313	21,094	3,292,902	1,665,521	41,617	5,000,940	244	229	133	287

¹ Includes Alabama, Arkansas, Georgia, Minnesota, New Jersey, New York, North Carolina, South Carolina, Tennessee, and Texas.

TABLE 14.—Gold, silver, and miscellaneous metal mines: Number of man-hours of exposure and number killed and injured, by States, during the year ended Dec. 31, 1932

State	Man-hours of exposure			Average hours per man per year			Number killed			Number injured				Wid- ows Or- phans			
	Under-ground	Surface	Open-cut	Total	Under-ground	Sur-face	Open-cut	Total	Under-ground	Sur-face	Open-cut	Total	Under-ground		Sur-face	Open-cut	Total
Alaska.....	2,042,066	3,844,608	17,132	5,886,704	2,061	1,791	1,071	1,904	5	1	1	5	105	89	---	194	
Arizona.....	509,270	179,376	1,842	705,678	1,480	1,281	1,303	1,411	1	1	1	2	17	3	---	20	
California.....	5,782,136	3,411,917	100,323	9,294,376	1,842	1,807	1,803	1,821	21	4	4	25	704	137	8	869	
Colorado.....	2,778,753	930,713	40,212	3,749,678	2,089	2,015	1,748	2,066	8	2	8	10	337	64	6	392	
Idaho.....	3,697,505	1,132,196	12,760	4,842,461	1,695	1,412	982	1,546	8	8	8	8	321	70	1	392	
Montana.....	542,062	1,165,877	960	1,708,899	1,698	1,580	480	1,618	2	2	2	2	24	9	---	33	
Nevada.....	1,034,926	208,434	4,800	1,248,160	1,975	1,681	800	1,909	2	2	2	2	63	13	---	76	
New Mexico.....	1,724,708	334,464	1,200	2,060,372	2,533	2,261	240	2,476	1	1	1	1	106	13	---	119	
Oregon.....	153,431	206,181	---	359,612	1,096	1,158	---	1,131	---	---	---	---	3	3	---	18	
South Dakota.....	2,054,136	1,738,020	5,064	3,794,596	2,607	2,651	720	2,624	2	2	2	6	146	37	---	183	
Utah.....	3,688,237	708,693	22,090	4,401,994	2,270	2,080	1,266	2,227	5	1	5	6	520	84	---	554	
Virginia.....	252,516	174,848	15,400	424,248	1,387	1,700	1,227	1,416	---	---	---	---	20	3	---	23	
Washington.....	174,848	34,000	15,416	211,084	1,135	1,087	1,133	1,133	---	---	---	---	8	3	---	11	
Wyoming.....	15,102	379,206	155,858	515,166	2,001	1,975	1,181	1,913	---	---	---	---	70	14	---	87	
Other States 1.....	1,946,727	13,391,162	377,655	14,314,544	1,956	1,838	1,207	1,904	52	9	9	61	2,464	506	18	2,988	
Total.....	26,396,453	13,391,162	377,655	40,165,270	1,956	1,838	1,207	1,904	52	9	9	61	2,464	506	18	2,988	24

1 Includes Alabama, Arkansas, Georgia, Minnesota, New Jersey, New York, North Carolina, South Carolina, Tennessee, and Texas.

TABLE 15.—Iron mines: Men employed and man-days, by States, during the year ended Dec. 31, 1932

State	Number of mines	Men employed			Man-days			Average days active					
		Under-ground	Surface	Open-cut	Total	Under-ground	Surface	Open-cut	Total	Under-ground	Surface	Open-cut	Total
Alabama.....	7	2,103	695	10	2,808	218,403	75,991	1,270	295,664	104	109	127	105
Michigan.....	53	2,898	1,607	132	4,697	349,408	235,990	17,045	651,822	136	141	129	139
Minnesota.....	53	1,486	737	1,209	3,432	240,238	157,410	224,243	674,091	195	214	187	196
Other States 1.....	17	488	273	286	1,017	74,448	42,364	36,463	153,275	153	155	142	151
Total.....	135	6,975	3,372	1,607	11,954	982,897	511,234	281,021	1,774,852	141	152	175	148

1 Includes Arkansas, New Jersey, New York, Missouri, Montana, Pennsylvania, Utah, Washington, Wisconsin, and Wyoming.

TABLE 16.—*Iron mines: Number of man-hours of exposure and number killed and injured, by States, during the year ended Dec. 31, 1932*

State	Man-hours of exposure				Average hours per man per year				Number killed				Number injured				Wid- ows Or phans
	Under- ground	Surface	Open-cut	Total	Under- ground	Sur- face	Open- cut	Total	Under- ground	Sur- face	Open- cut	Total	Under- ground	Sur- face	Open- cut	Total	
Alabama.....	2,122,576	731,010	12,700	2,866,286	1,009	1,052	1,270	1,021	2	53	5	59	1	59	1	59	2
Michigan.....	3,167,212	2,241,203	151,449	5,559,864	1,093	1,344	1,147	1,184	2	81	10	93	2	93	2	93	2
Minnesota.....	2,346,064	1,568,764	2,254,027	6,168,855	1,579	2,129	1,864	1,797	1	1	1	2	1	2	24	26	2
Other States ¹	606,400	395,651	311,458	1,313,509	1,243	1,449	1,217	1,292	1	20	3	23	3	26	3	26	2
Total.....	8,242,252	4,936,628	2,726,634	15,908,514	1,182	1,464	1,699	1,331	5	204	30	239	30	264	30	264	4

¹ Includes Arkansas, New Jersey, New York, Missouri, Montana, Pennsylvania, Utah, Washington, Wisconsin, and Wyoming.

Lead and zinc mines (Mississippi Valley States).—A higher fatality rate and a reduced nonfatal-injury rate were revealed by reports from companies operating lead and zinc mines in the Mississippi Valley during 1932. The rates for these mines, with which are also included fluorspar mines in Illinois and Kentucky, were 1.63 for fatalities and 67.80 for nonfatal injuries compared with 1.06 and 72.81, respectively, in 1931. Employment was much below the previous year's level, the average number of men working in and about the mines being only 3,999 as against 6,175 in 1931. The exposure to occupational hazards was 5,531,228 man-hours, 42 percent less than in the year before. This represented a working period of 171 days or 1,383 hours for the average employee compared with the 1931 average of 189 days or 1,533 hours. Accidents among the men working at the mines caused 9 deaths and 375 injuries disabling an employee for more than the remainder of the day of the accident. Table 21 shows the causes of the accidents.

Missouri, Oklahoma, and Kansas, in the order named, employed the largest number of men in the production of lead and zinc ores in the region. The frequencies of accidents, fatal and nonfatal, per million man-hours of exposure in these three States in 1931 and 1932 were as follows:

	1931	1932
Missouri.....	54.7	50.7
Oklahoma.....	113.4	135.3
Kansas.....	94.8	46.8

The progress made in accident prevention in Missouri and Kansas in 1932 is evident from the lowered accident rates. Accidents at the mines in Oklahoma increased in frequency.

Nonmetallic mineral mines.—This group, which includes all mines except those producing coal, metal, or stone, reduced its fatal- and nonfatal-accident rates in 1932. The injury rate per million man-hours of exposure was 44.65 and the fatality rate 0.59 compared with 46.88 and 0.61, respectively, in 1931. The actual number of accidents included 7 deaths and 528 nonfatal lost-time injuries. An average of 6,686 men was employed for 201 days or 1,769 hours during the year. A total exposure of 11,824,893 man-hours was reported by the operating companies, a reduction of nearly 34 percent from the amount of labor performed in the previous year. Table 21 shows the number and cause of accidents at the mines as reported by the companies.

TABLE 17.—Lead and zinc mines ¹ (Mississippi Valley): Men employed and man-days, by States, during the year ended Dec. 31, 1932

State	Num-ber of mines	Men employed				Man-days				Average days active			
		Under-ground	Surface	Open-cut	Total	Under-ground	Surface	Open-cut	Total	Under-ground	Surface	Open-cut	Total
Illinois.....	6	32	14	61	107	3,283	1,046	3,060	7,389	103	75	50	69
Kansas.....	10	344	54	-----	398	48,937	7,144	-----	56,081	142	132	-----	141
Kentucky.....	9	52	28	-----	80	5,648	2,938	-----	8,586	109	105	-----	107
Missouri.....	14	1,712	166	-----	1,878	276,976	26,578	-----	303,554	162	160	-----	162
Oklahoma.....	16	824	79	-----	903	141,359	12,674	-----	154,033	172	160	-----	171
Other States ²	7	456	162	15	633	111,873	37,448	3,780	153,101	245	231	252	242
Total.....	62	3,420	503	76	3,999	588,076	87,828	6,840	682,744	172	175	90	171

¹ Includes fluorspar mines in Illinois and Kentucky.² Includes Tennessee and Wyoming.

TABLE 18.—Lead and zinc mines ¹ (Mississippi Valley): Number of man-hours of exposure and number killed and injured, by States, during the year ended Dec. 31, 1932

State	Man-hours of exposure			Average hours per man per year			Number killed			Number injured			Wid- ows	Or- phans
	Under- ground	Surface	Open- cut	Total	Under- ground	Sur- face	Open- cut	Total	Under- ground	Sur- face	Open- cut	Total		
Illinois.....	26,280	8,368	24,400	59,028	821	598	400	552	4	4	1	5	2	1
Kansas.....	389,896	59,266	449,192	1,133	1,098	1,129	1,012	1,229	4	15	2	17	2	1
Kentucky.....	47,078	25,842	72,920	1,905	923	1,280	1,293	1,312	2	1	1	121	1	1
Missouri.....	2,215,724	212,424	2,428,148	1,284	1,280	1,367	1,372	1,372	1	1	1	165	2	3
Oklahoma.....	1,130,871	103,666	1,234,537	1,372	1,312	2,063	2,034	2,034	1	1	1	66	2	3
Other States ²	1,940,829	316,334	30,240	1,287,403	2,063	1,953	2,016	2,034	1	1	1	66	2	3
Total.....	4,750,658	725,930	54,640	5,531,228	1,389	1,443	719	1,383	8	1	1	375	5	5

¹ Includes fluorspar mines in Illinois and Kentucky.² Includes Tennessee and Wyoming.

TABLE 19.—Nonmetallic mineral mines: Men employed and man-days, by States, during the year ended Dec. 31, 1932

State	Number of mines	Men employed				Man-days				Average days active			
		Under-ground	Surface	Open-cut	Total	Under-ground	Surface	Open-cut	Total	Under-ground	Surface	Open-cut	Total
Arizona.....	6	64	2	7	73	11,403	180	1,487	12,900	178	75	205	178
California.....	60	231	63	140	434	13,451	13,451	27,490	87,284	222	214	160	201
Colorado.....	24	32	5	27	64	2,509	65,484	3,206	6,170	78	91	119	96
Florida.....	11	32	274	484	758	65,484	65,484	98,487	168,941	---	239	203	216
Georgia.....	9	12	28	180	190	1,078	2,285	40,068	41,807	90	238	267	252
Idaho.....	5	63	17	21	73	12,440	2,862	2,713	14,685	197	110	96	201
Iowa.....	8	85	17	21	123	8,819	30,488	7,150	12,694	104	223	150	103
Kansas.....	8	224	137	5	366	36,568	30,488	6,760	69,833	172	87	118	191
Kentucky.....	4	10	15	245	279	1,748	1,310	28,820	31,878	92	102	---	114
Louisiana.....	5	134	188	44	322	35,788	18,191	---	54,979	267	87	---	171
Michigan.....	6	103	33	44	180	20,341	8,086	7,797	36,574	201	151	177	203
Missouri.....	10	20	4	131	164	3,345	4,695	15,110	19,960	116	161	115	116
Nevada.....	9	21	10	28	59	4,785	2,132	4,460	11,368	228	213	189	193
New York.....	21	525	128	13	666	90,749	29,312	12,107	127,788	173	234	162	184
North Carolina.....	6	43	4	57	104	9,465	43,848	11,310	21,694	220	80	198	203
Tennessee.....	8	161	161	283	444	---	---	34,880	78,398	---	272	122	177
Texas.....	16	10	1,002	82	1,100	1,150	358,194	15,084	367,668	91	352	189	354
Utah.....	12	80	45	4	129	17,201	9,868	1,068	27,894	215	211	267	216
Virginia.....	11	80	351	153	585	11,000	49,083	18,912	79,855	143	140	124	136
Other States ¹	62	229	60	284	573	33,482	7,084	39,749	80,285	146	118	140	140
Total.....	301	1,991	2,537	2,188	6,686	356,999	644,958	345,305	1,346,862	179	284	160	201

¹ Includes Alabama, Arkansas, Connecticut, Illinois, Maine, Maryland, Massachusetts, Montana, New Hampshire, New Jersey, New Mexico, Ohio, Oklahoma, Pennsylvania, South Carolina, South Dakota, Vermont, Washington, Wisconsin, and Wyoming.

TABLE 20.—Nonmetallic mineral mines: Number of man-hours of exposure and number killed and injured, by States, during the year ended Dec. 31, 1932

State	Man-hours of exposure			Average hours per man per year			Number killed			Number injured			Wid- ows	Or- phans	
	Under- ground	Surface	Total	Under- ground	Sur- face	Total	Under- ground	Sur- face	Total	Under- ground	Sur- face	Open- cut			Total
Arizona.....	91, 224	1, 200	103, 920	1, 425	600	1, 642	1, 424	-----	-----	7	-----	-----	7	-----	-----
California.....	411, 529	110, 511	707, 927	1, 754	1, 326	1, 630	1, 630	-----	-----	43	4	7	54	-----	-----
Colorado.....	20, 332	3, 400	50, 890	1, 635	1, 006	1, 977	1, 795	-----	-----	1	-----	-----	3	-----	-----
Florida.....	-----	604, 607	957, 027	-----	2, 207	1, 977	2, 060	-----	-----	-----	20	28	48	1	2
Georgia.....	-----	66, 640	400, 652	-----	2, 350	2, 671	2, 516	-----	-----	-----	-----	8	13	-----	-----
Iowa.....	10, 750	18, 040	117, 550	868	1, 804	1, 610	1, 610	-----	-----	-----	-----	-----	11	-----	-----
Kansas.....	99, 520	14, 628	100, 535	1, 580	1, 860	767	1, 817	-----	-----	-----	-----	-----	8	-----	-----
Kentucky.....	69, 807	282, 362	6, 000	1, 821	2, 061	1, 200	1, 747	-----	-----	40	9	-----	49	-----	-----
Kentucky.....	350, 864	12, 640	639, 226	1, 566	843	1, 176	1, 763	-----	-----	-----	-----	-----	20	-----	-----
Louisiana.....	345, 395	162, 146	507, 541	2, 578	862	1, 576	1, 576	-----	-----	24	-----	-----	24	-----	-----
Louisiana.....	141, 801	62, 347	271, 210	1, 377	1, 889	1, 507	1, 507	-----	-----	12	2	1	15	-----	-----
Michigan.....	26, 756	4, 838	123, 971	1, 823	1, 210	946	1, 949	-----	-----	-----	-----	-----	6	-----	-----
Missouri.....	38, 264	17, 056	35, 603	1, 922	1, 706	1, 272	1, 541	-----	-----	14	1	1	16	-----	-----
Nevada.....	699, 878	243, 233	963, 257	1, 333	1, 900	1, 550	1, 446	-----	-----	1	-----	-----	1	-----	-----
New York.....	87, 369	2, 532	203, 021	2, 032	1, 638	1, 984	1, 952	-----	-----	8	-----	-----	11	-----	-----
North Carolina.....	-----	438, 480	783, 980	-----	2, 723	1, 221	1, 766	-----	-----	-----	-----	-----	27	-----	-----
Tennessee.....	11, 967	2, 873, 252	3, 005, 297	750	2, 868	1, 464	2, 732	-----	-----	-----	-----	-----	11	-----	-----
Texas.....	139, 448	8, 544	224, 054	1, 743	1, 690	2, 136	1, 737	-----	-----	-----	-----	-----	8	-----	-----
Utah.....	92, 858	555, 781	840, 394	1, 446	1, 583	1, 253	1, 437	-----	-----	1	3	1	4	-----	-----
Virginia.....	279, 407	66, 033	703, 608	1, 220	1, 101	1, 261	1, 228	-----	-----	-----	-----	-----	40	-----	-----
Other States ¹	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1	-----	-----
Total.....	2, 932, 961	5, 615, 818	11, 824, 893	1, 473	2, 214	1, 518	1, 769	2	5	7	210	172	146	528	8

¹ Includes Alabama, Arkansas, Connecticut, Illinois, Maine, Maryland, Massachusetts, Montana, New Hampshire, New Jersey, New Mexico, Ohio, Oklahoma, Pennsylvania, South Carolina, South Dakota, Vermont, Washington, Wisconsin, and Wyoming.

TABLE 21.—All mines: Fatalities and injuries, classified by kind of mine and severity of injury, during the year ended Dec. 31, 1932

Kind of mine and severity of injury	Underground													Shaft										
	Fall from roof or ore	Rock or ore while loading at working face	Hand tools	Explosives	Haulage	Falling down chute, winze, raise, or slope	Run of ore from chute or pocket	Drilling	Electricity	Machinery	Mine fires	Suffocation from natural gases	Inrush of water	Stepping on nail	Handling material (other than rock or ore)	Other causes	Total, underground	Falling down shaft	Objects falling down shaft	Breaking of cables	Overwinding	Skip, cage, or bucket	Other causes	Total, shaft
Killed:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15a	15b	16	17	18	19	20	21	22	23
Copper.....	4		3	2	1	1	1		1	1	1	1				1	2	1			4	4		8
Gold, silver, and miscellaneous metal.....	18		12	1	1	7	1		2	1	4						2	1			3			6
Iron.....	2		1	1													1		1		1			3
Lead and zinc (Mississippi Valley).....	2		3														1	1						3
Nonmetallic mineral.....	1																1							1
Total.....	27		19	4	4	8	1	1	2	2	5				1	1	3	2	1		8	4		18
Permanent total:																								
Copper.....	1			1	1			1	1												1			1
Gold, silver, and miscellaneous metal.....																								
Iron.....																								
Lead and zinc (Mississippi Valley).....																								
Nonmetallic mineral.....																								
Total.....	1			2	2			1	1												1			1
Permanent partial:																								
Copper.....	4	1	1	1	1	4	1	1	1	3				1		1		1						1
Gold, silver, and miscellaneous metal.....	20	2	2	9	12	4	1	2		5					4	0					1	2		3
Iron.....	1	1	3	6	6	2		5		5				2	2	2					1			1
Lead and zinc (Mississippi Valley).....	3	1	2	6	6	2									1	1								1
Nonmetallic mineral.....			1	1																				1
Total.....	28	5	7	12	25	6	1	9	8	8				1	6	13		1			3	2		6

Temporary:																					
Copper.....	59	87	6	66	36	5	45	1	6	6	1	1	6	37	139	649	4	13	5	19	41
Gold, silver, and miscellaneous metal.....	289	216	31	245	135	84	284	13	36	1	5	1	41	172	392	2,317	8	16	29	16	69
Iron.....	16	6	11	22	14	5	9	---	2	2	---	---	2	15	45	314	1	4	4	3	8
Lead and zinc (Mississippi Valley).....	72	14	2	56	14	2	37	2	8	---	1	---	2	10	45	314	---	---	---	---	7
Nonmetallic mineral.....	39	22	1	19	3	2	16	---	8	---	1	---	2	11	41	198	---	3	5	2	10
Total.....	699	455	345	400	198	98	341	16	59	1	8	1	51	265	652	3,649	13	36	43	43	135
Total nonfatal:																					
Copper.....	159	60	88	67	36	5	46	1	6	---	1	---	6	37	140	658	4	14	5	19	42
Gold, silver, and miscellaneous metal.....	462	271	40	259	139	85	287	13	40	1	5	1	42	177	401	2,391	8	16	31	18	42
Iron.....	36	17	9	26	14	5	10	---	8	---	---	---	37	19	191	---	1	---	5	3	4
Lead and zinc (Mississippi Valley).....	38	73	15	62	12	2	42	2	6	---	1	---	2	10	66	335	---	4	---	3	7
Nonmetallic mineral.....	33	39	22	19	3	2	16	---	8	---	1	---	2	11	41	199	---	3	---	2	11
Total.....	728	460	352	436	204	99	351	16	68	1	8	1	52	272	667	3,778	13	37	47	45	142
Total fatal and nonfatal:																					
Copper.....	163	60	88	69	37	5	46	1	7	---	2	---	6	37	141	671	4	14	9	23	50
Gold, silver, and miscellaneous metal.....	480	271	218	260	146	86	287	15	41	1	9	1	42	177	401	2,437	10	17	34	18	79
Iron.....	38	17	9	30	14	5	10	---	8	---	---	---	2	38	19	---	1	---	5	3	9
Lead and zinc (Mississippi Valley).....	40	73	15	7	62	2	42	2	6	---	1	---	2	10	66	340	1	4	1	3	10
Nonmetallic mineral.....	34	39	22	19	3	2	16	---	8	---	1	---	2	11	41	200	---	4	6	2	12
Total.....	755	460	352	440	212	100	351	18	70	1	13	1	52	273	668	3,848	16	39	55	49	160

COMPARISON OF NONFATAL-INJURY RATES FROM CHIEF CAUSES OF ACCIDENTS UNDERGROUND (INCLUDING SHAFT) IN PRINCIPAL MINING STATES

More than 97 out of every 100 accidents in the metal and nonmetal mines (excluding coal mines) in the United States in 1932 resulted in injuries of a nonfatal character, and by far the largest number of these injuries were, as usual, due to only a few generally recognized causes. Seven of the leading causes of accidents accounted for more than 71 percent of all injuries to underground workers; also more than 73 percent of all injuries to men engaged in opencut mining were due to the same number of well-recognized hazards in that class of work.

A comparison of the accident rates for the principal classes of accidents in the larger mining States partly explains the generally favorable records of certain States and the comparatively high rates of other States.

The comparative rates given in table 22 relate to nonfatal injuries only in States employing 1,000 or more men underground or 200 or more men in open-cut mining.

UNDERGROUND MINING

Alabama.—Metal and nonmetal mining in Alabama had a particularly good safety record in 1932; the accident-frequency rate for nonfatal injuries underground, although a fraction higher than in 1931, was only about one third as high as the average rate for underground mining in the United States as a whole. The State safety record was decidedly favorable for 6 out of the 7 leading causes of mine accidents; the only exception was injuries due to handling materials, and for this class of accidents the Alabama rate was only slightly higher than the general average.

Arizona.—A rate of 64.13 per million man-hours of exposure for for underground work was reported by operators in Arizona for 1932. This rate compares with 60.40 for the previous year but is lower than the United States average—74.70. Accidents for which the Arizona rates were more favorable than the average for the United States were those due to loading at the working face, haulage, and especially hand tools, drilling, and persons falling.

California.—The accident rate for California (120.69) was higher than the United States average (74.70). However, the State rate for 1932 represented a material improvement over the 140.37 for 1931. The excess of the California rate over that for the United States was distributed generally over the seven leading causes of mine accidents underground.

Colorado.—The nonfatal-injury rate among underground workers in Colorado in 1932 was 126.91 per million man-hours of exposure underground compared with 112.76 for Colorado in 1931 and 74.70 for the United States in 1932. The Colorado rate was higher than the United States rate for each of the seven principal causes of mine accidents, as shown in table 22, more particularly for accidents caused by falling roof, drilling, and persons falling down chute, winze, raise, or stope.

Idaho.—From a rate of 82.32 for nonfatal injuries to underground employees at mines in Idaho in 1931 the rate rose to 86.24 in 1932, the United States average for 1932 being 74.70. However, the rate for

Idaho was more favorable than the general average rate for two classes of accidents—haulage and persons falling down chutes, winzes, etc.

Michigan.—The underground injury rate for mines in Michigan was only about two thirds as high as the average for underground noncoal mining in general. Particularly favorable were the Michigan rates for falling roof, haulage, hand tools, drilling, and handling materials. The Michigan rate, which was 47.22, represented a substantial improvement over the State rate of 58.37 for 1931.

Minnesota.—This State was outstanding for its unusually low accident rate for underground mining of only 21.24 per million man-hours of exposure underground—less than one third the average for the United States. The Minnesota rate for the previous year, 1913, was also notably favorable. Each of the seven leading causes of mine accidents was lower and therefore more favorable in Minnesota than in the United States as a whole.

Missouri.—The nonfatal-injury rate for underground mining in Missouri was 53.90, approximately two thirds as high as the average rate for the United States and lower than the State rate of 57.06 in 1931. The rates for accidents due to loading, haulage, and drilling were higher in Missouri mines than the average for the industry, but the Missouri rates were more favorable than the average for accidents from falling roof, hand tools, and handling materials.

Montana.—Metal mines in Montana reported a nonfatal-injury rate of 63.17 per million man-hours of exposure in 1932, reflecting a marked improvement over the State rate of 82.02 for the preceding year and indicating a favorable difference of 11.53 points compared with the corresponding rate of 74.70 for the United States as a whole. The favorable position of Montana mines in 1932 is explained by the low rates for accidents due to loading ore, drilling, handling materials, and persons falling down chutes, winzes, raises, and stopes. However, the accident rate for hand tools was comparatively high, being 15.79 in Montana compared with a general average of 6.71 for underground work in all mines.

Utah.—The frequency of nonfatal injuries among men employed underground in mines in Utah was 138.65 per million man-hours of exposure underground in 1932 compared with 137.52 in 1931 in the same State and 74.70 in the United States as a whole in 1932. Examination of the accident reports showed that the Utah rate was higher than the average for the United States due particularly to accidents from falling roof, haulage, drilling, handling materials, and falls of persons.

OPEN-CUT MINING

The average accident rate for nonfatal injuries at open-cut mines in the United States was 29.02 per million man-hours of exposure to the hazards of that class of work. Of 9 States that employed 200 or more men in 1932, 3 States (Utah, Minnesota, and Arizona) had injury rates that were more favorable than the average for the United States. The rates for 6 States (Florida, Tennessee, New Mexico, Nevada, California, and Kentucky) were higher than the combined rate for metal and nonmetal open-cut work in all States. Comparative rates for the various States are given in table 22.

TABLE 22.—All mines: Nonfatal-injury rates per million man-hours worked underground and in open-cut mines, by principal causes, for important States, during the year ended Dec. 31, 1932

UNDERGROUND											
Cause	Min- ne- sota	Ala- bama	Mich- igan	Mis- souri	Mon- tana	Ari- zona	Unit- ed States	Ida- ho	Cali- for- nia	Colo- rado	Utah
Fall of rock or ore from roof or wall.....	6.37	2.36	8.41	6.68	15.00	15.27	13.87	18.09	20.68	28.44	30.04
Rock or ore while loading at working face.....	.42	3.77	6.14	11.58	5.00	4.33	8.77	10.22	12.50	13.15	11.30
Haulage.....	3.82	6.12	3.56	10.25	7.90	5.09	8.31	7.34	14.27	11.73	21.82
Hand tools.....	.85	.94	1.94	2.67	15.79	4.83	6.71	9.70	12.98	7.82	9.76
Drilling.....	1.41	1.94	12.03	3.42	6.11		6.69	7.08	11.70	14.57	14.12
Handling materials (other than rock or ore).....	3.40	6.12	2.59	.45	4.21	5.85	5.18	7.60	10.90	6.75	14.12
Falling down chute, winze, raise, or stope.....	2.12	.47	3.56	3.12	2.37	3.56	3.89	2.62	10.42	7.11	6.93
All causes (underground including shaft).....	21.24	24.97	47.22	53.90	63.17	64.13	74.70	86.24	120.69	126.91	138.65

OPEN-CUT											
Cause	Utah	Min- ne- sota	Ari- zona	Unit- ed States	Flori- da	Ten- nes- see	New Mex- ico	Ne- vada	Cali- for- nia	Ken- tucky	
Handling materials.....	1.06	2.58	6.44	6.34	7.31	-----	2.67	16.51	-----	20.82	
Falls or slides of rock or ore.....	.43	3.22	4.11	4.11	1.04	2.66	13.36	2.75	13.99	-----	
Hand tools.....	.43	-----	2.58	2.09	-----	5.34	5.50	7.00	6.94	-----	
Haulage.....	1.72	3.22	2.35	1.04	-----	2.67	8.26	7.00	6.94	-----	
Falls of persons.....	1.06	1.29	3.22	2.11	2.09	10.65	2.67	5.50	-----	3.47	
Power shovels.....	1.72	3.22	2.11	-----	5.32	-----	8.26	-----	-----	-----	
Machinery.....	1.29	-----	1.76	2.09	-----	8.01	2.75	3.50	6.94	-----	
All causes (open-cut).....	3.19	10.75	22.55	29.02	29.26	29.28	48.09	52.28	52.46	69.40	

ACCIDENTS CLASSIFIED BY MINING METHODS

The classification of mining methods employed in this bulletin was prepared by the Mining Division of the Bureau of Mines and used in the division's studies of the relative efficiency of various mining methods from the standpoint of productivity and costs. The classification was used in this series of statistical bulletins for the first time in the bulletin covering the calendar year 1929; it is as follows:

- A. Underground methods:
1. Open stope, including the room-and-pillar method and sublevel stoping
 2. Shrinkage
 3. Cut-and-fill
 4. Square-set
 5. Block caving
 6. Sublevel caving
 7. Top slicing
- B. Surface methods:
8. Open-cut with power shovel
 9. Open-cut with power scraper
 10. Open-cut, hand loading only
 11. Hydrauliclicking
 12. Dredging

From the standpoint of the number of companies and States represented and the number of men employed in the mines the most widely used operating method in metal mines in the United States is the open-stope method, including the room-and-pillar method and sublevel stoping. Next in importance in number of persons employed is the square-set method. Ranking next among underground methods of mining are top slicing, cut-and-fill, sublevel caving, shrinkage, and block caving.

Figures for 1932 showed that the combined accident-frequency rate for fatalities and injuries in underground mining was most favorable for top slicing, the next lowest accident rate being that for sublevel caving. These two classes also showed the lowest rates in 1931. The highest rate was reported by mines using square-set methods, while shrinkage showed a rate second from the highest.

It should be made clear in this connection that a mining company is not free to choose any method of mining that officials may prefer; it is not free to adopt any method solely from the standpoint of safety. The method to be used is determined mainly by the type of deposit, the character and value of the ore, and the possibility of extracting the ore at an economically sound price.

Table 23 shows the number of employees in mines using each of the various methods and the comparative accident-frequency rates of these mines for fatalities and nonfatal lost-time injuries. Each mine is classified according to its principal mining method, as shown in the company report to the Bureau of Mines.

TABLE 23.—Metal-mine accident data, grouped by mining methods, during the year ended Dec. 31, 1932, for selected companies ¹

Method of mining	Number of mines	Number of States	Average days active	Man-days	Men employed	Man-hours of exposure	Number killed	Number injured	Rate per million man-hours	
									Killed	Injured
Open stope, including room-and-pillar and sublevel stoping.....	85	19	178	1,525,330	8,549	12,675,345	14	970	1.10	76.53
Shrinkage.....	19	10	231	257,902	1,116	2,065,151	5	160	2.42	77.48
Cut-and-fill.....	13	8	263	450,510	1,715	3,604,076	17	214	4.72	59.38
Square-set.....	29	7	281	1,323,549	4,714	10,553,636	15	1,100	1.42	104.23
Block caving.....	7	5	153	141,731	925	1,139,486	1	90	.....	78.98
Sublevel caving.....	16	4	157	264,704	1,682	2,077,681	3	65	1.44	31.28
Top slicing.....	22	3	195	392,080	2,007	3,147,636	1	70	.32	22.24
Open-cut, with power shovel.....	38	13	180	607,208	3,379	5,499,233	1	120	.18	21.82
Open-cut, hand loading only.....	4	4	129	25,214	195	240,843	1	7	4.15	29.06
Total.....	233	.....	205	4,988,228	24,282	41,003,087	57	2,796	1.39	68.19

¹ Underground and open-cut only. No reports used when less than 25 men were employed.

PLACER MINING

Reports received by the United States Bureau of Mines for 1932 covered placer mines that employed 4,295 men. In addition, as stated elsewhere, thousands of men, whose actual number is not known, spent much of their time panning for gold in various sections of the country; ordinarily these men are not engaged in mining, and no reports for them were received by the Bureau of Mines. Nearly one

third of those shown by reports to the Bureau to have worked at placers were employed in dredging operations, chiefly in Alaska and California; about one fourth of the total number worked at placers using hydraulicking methods, chiefly in Alaska, California, and Idaho; and approximately one fifth were employed underground, principally in California and Alaska. The remainder worked at surface shops and yards.

The lowest accident rate for placer mining in 1932 was for hydraulicking and the next lowest for dredging. Underground placer mining reported the second highest rate and surface shops and yards the highest.

Different causes of accidents vary in importance from year to year. In 1932 haulage accidents caused more injuries than any other single hazard at underground placers. Reports from dredging operations revealed falls of persons and handling materials as the principal causes of accidents. In hydraulicking, handling rock was the chief cause of injuries.

TABLE 24.—*Placer mines: Men employed, man-days, and number killed and injured during the years ended Dec. 31, 1931 and 1932*

	1931					1932				
	Under-ground	Sur-face	Dredg-ing	Hy-drau-lick-ing	Total	Under-ground	Sur-face	Dredg-ing	Hy-drau-lick-ing	Total
Men employed.....	657	671	1,452	957	3,737	894	960	1,345	1,096	4,295
Man-days.....	110,200	132,356	361,418	139,205	743,179	148,400	187,176	333,688	159,765	829,029
Average days active.....	168	197	249	145	199	166	195	248	146	193
Number killed.....	2	1	2	1	5	2	1	2	2	5
Number injured.....	42	83	110	21	256	45	70	85	27	227
Killed per million man-hours.....						1.69	0.66	0.76		0.75
Injured per million man-hours.....	47.71	80.70	37.89	18.23	42.92	38.05	46.21	32.31	20.09	34.02

TABLE 25.—*Placer mines: Severity of injury during the years ended Dec. 31, 1931 and 1932*

	1931					1932						
	Killed	Perma-nent total disa-bility	Perma-nent partial disa-bility	Tempo-rary	Total non-fatal	Grand total	Killed	Perma-nent total disa-bility	Perma-nent partial disa-bility	Tempo-rary	Total non-fatal	Grand total
Underground.....			2	40	42	42	2			45	45	47
Surface.....				83	83	83	1		1	69	70	71
Dredging.....			1	109	110	110	2		3	82	85	87
Hydraulicking.....				21	21	21			1	26	27	27
Total.....			3	253	256	256	5		5	222	227	232

TABLE 26.—Placer mines: Number killed and injured, by causes, during the years ended Dec. 31, 1931 and 1932

Cause	1931		1932	
	Killed	Injured	Killed	Injured
Fall of rock or ore from roof or wall.....		5	1	5
Rock or ore while loading at working face.....		2		4
Hand tools.....		5		6
Mine fires.....				
Haulage.....		11		8
Falling down chute, winze, raise, or stope.....		2		4
Run of ore from chute or pocket.....		1		1
Drilling.....		4		2
Machinery.....		2		1
Stepping on nail.....		1		1
Handling materials (other than rock or ore).....		4		4
Other causes.....		3		9
Total, underground.....		40	1	45
Falling down shaft.....			1	
Objects falling down shaft.....				
Skip, cage, or bucket.....		2		
Other causes.....				
Total, shaft.....		2	1	
Mine cars, mine locomotives, or aerial trams.....		1		1
Railway cars and locomotives.....				
Falls of persons.....		9		12
Stepping on nail.....		1		5
Hand tools.....		23		11
Electricity.....		1		1
Machinery.....		7	1	5
Handling materials.....		10		7
Other causes.....		31		28
Total, surface.....		83	1	70
Machinery.....		17		9
Electricity.....		2	1	
Boiler explosions or bursting steam pipes.....		1		
Falls of persons.....		19		24
Hand tools.....		20		9
Handling materials.....		11		18
Other causes.....		40	1	25
Total, dredging.....		110	2	85
Cave of bank.....		3		
Explosives.....				
Hydraulic giants.....				4
Falls of persons.....		2		3
Rock while handling.....		1		7
Hand tools.....		5		3
Machinery.....		1		
Handling materials (other than rock or ore).....		1		3
Other causes.....		8		7
Total, hydraulicking.....		21		27
Grand total.....		256	5	227

COMPARATIVE ACCIDENT RATES FOR 1932 AND PREVIOUS YEARS

Tables 27 and 28 present comparative accident rates for mines in 1932 and earlier years. The rates given in these tables show the number of accidents per thousand 300-day workers. The preparation of rates on the basis of man-hours of exposure was not practicable for the full period covered by the table, as figures for years prior to 1931 were prepared on a basis of man-shifts rather than man-hours.

TABLE 27.—All mines: Number of fatalities and injuries and fatality and injury rates per thousand 300-day workers, classified by severity of injury, 1923-32

NUMBER OF ACCIDENTS							
Severity of injury	Total 1923-27	1928	1929	1930	1931	1932	Total 1923-32
Fatal.....	1,938	273	350	271	158	107	1,159
Permanent total ¹	82	19	22	22	15	10	88
Permanent partial ²	2,543	550	455	481	292	167	1,945
Temporary ³	154,671	21,914	22,615	15,091	8,398	4,837	72,856
Total.....	159,234	22,756	23,442	15,865	8,863	5,121	76,047

RATES PER THOUSAND 300-DAY WORKERS							
Fatal.....	3.22	2.50	3.03	2.92	2.53	2.89	2.78
Permanent total ¹.....	.14	.17	.19	.24	.24	.27	.21
Permanent partial ²	4.22	5.03	3.94	5.18	4.68	4.52	4.66
Temporary ³	256.84	200.41	195.98	162.44	134.58	130.79	174.70
Total.....	264.42	208.11	203.14	170.78	142.03	138.47	182.35
Average number of 300-day workers per year.....	602,204	109,345	115,394	92,900	62,405	36,984	417,028

¹ Permanent total disability: Loss of both legs or arms, 1 leg and 1 arm, total loss of eyesight, paralysis, or other condition permanently incapacitating workman from doing any work of a gainful occupation.

² Permanent partial disability: Loss of 1 foot, leg, arm, hand, or eye, 1 or more fingers, 1 or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.

³ Disability for more than remainder of day of accident.

TABLE 28.—Number of men employed, man-days, and number of men killed and injured at all mines (except coal mines) in the United States, 1911–32

Year	Average days active	Men employed		Total shifts	Number killed		Number injured	
		Actual number	Equivalent in 300-day workers (calculated)		Total	Per thousand 300-day workers (calculated)	Total	Per thousand 300-day workers (calculated)
1911.....	282	165, 979	156, 088	46, 826, 573	695	4. 45	26, 577	170. 27
1912.....	287	168, 550	161, 059	48, 317, 800	661	4. 10	30, 734	190. 82
1913.....	288	191, 276	183, 594	55, 077, 855	683	3. 72	32, 971	179. 59
1914.....	271	158, 115	142, 620	42, 785, 840	559	3. 92	30, 216	211. 87
1915.....	280	152, 118	141, 997	42, 599, 015	553	3. 89	35, 295	248. 56
Average for 5 years....	282	167, 208	157, 072	47, 121, 417	630	4. 01	31, 159	198. 37
1916.....	282	204, 685	192, 455	57, 736, 425	697	3. 62	48, 237	250. 64
1917.....	287	200, 579	192, 085	57, 625, 811	852	4. 44	46, 286	240. 97
1918.....	297	182, 606	181, 006	54, 301, 748	646	3. 57	42, 915	237. 09
1919.....	279	145, 262	134, 871	40, 461, 350	468	3. 47	31, 506	233. 60
1920.....	296	136, 583	134, 540	40, 361, 893	425	3. 16	32, 562	242. 02
Average for 5 years....	288	173, 943	166, 991	50, 097, 445	618	3. 70	40, 301	241. 34
Average for 10 years....	285	170, 576	162, 031	48, 609, 431	624	3. 85	35, 730	220. 51
1921.....	238	93, 929	74, 509	22, 352, 702	230	3. 09	18, 604	249. 69
1922.....	276	105, 697	97, 138	29, 141, 293	344	3. 54	26, 080	268. 48
1923.....	297	123, 279	121, 866	36, 559, 805	367	3. 01	33, 563	275. 41
1924.....	290	123, 128	119, 113	35, 734, 008	418	3. 51	33, 118	278. 04
1925.....	293	126, 713	123, 908	37, 172, 359	371	2. 99	35, 132	283. 53
Average for 5 years....	281	114, 549	107, 307	32, 192, 033	346	3. 23	29, 299	273. 04
Average for 15 years....	284	151, 933	143, 790	43, 136, 965	531	3. 69	33, 586	233. 58
1926.....	291	127, 823	123, 870	37, 160, 978	430	3. 47	30, 350	245. 01
1927.....	284	119, 699	113, 447	34, 033, 963	352	3. 10	25, 133	221. 54
1928.....	288	113, 866	109, 345	32, 803, 610	273	2. 50	22, 483	205. 61
1929.....	292	118, 735	115, 394	34, 618, 120	350	3. 03	23, 092	200. 11
1930.....	270	103, 233	92, 900	27, 869, 982	271	2. 92	15, 594	167. 86
Average for 5 years....	285	116, 671	110, 991	33, 297, 330	335	3. 02	23, 330	210. 20
Average for 20 years....	284	143, 093	135, 590	40, 677, 056	482	3. 55	31, 022	228. 79
1931.....	231	80, 940	62, 405	18, 721, 486	158	2. 53	8, 709	139. 56
1932.....	208	53, 288	36, 984	11, 095, 167	107	2. 89	5, 014	135. 57

ACCIDENT RATES FOR PRINCIPAL COUNTIES

Table 29 shows the accident-frequency rates per million man-hours of exposure and other pertinent data for the principal counties of the more important metal-mining and nonmetal-mining States covered by this publication. The accident rate of a State is obviously a composite rate, reflecting the net result of the accident-prevention efforts of all mines within the State. It is often true that the mines in one or two counties will account largely for the success or failure of a State as a whole to reduce its accident rate. The figures in table 29 are therefore presented to aid in localizing the situation to some extent by revealing the accident rates of the counties separately, thus showing what sections of the State are contributing most heavily to the general effort to prevent accidents.

Trotmunde	205,476	40,352	245,828	3	3	15	18	14,60	73,00	74,35
Yuba	26,728	281,328	502,056	2	7	2	9	.....	74,83	24,88
All other ¹	246,464	90,439	592,541	14	7	14	36	.....	56,80	58,68
Total	6,238,983	285,910 ³	10,051,955	4	25	753	15	3,37	120,69	52,46
Colorado:									1,13	45,65
Boulder	116,248	26,192	142,440	1	1	13	1	8,60	111,83	38,19
Clear Creek	94,411	31,834	126,295	2	2	2	1	.....	21,18	31,36
Dolores	91,222	20,728	111,950	17	4	17	4	.....	186,36	192,98
Eagle	178,943	92,672	271,615	11	11	11	11	.....	61,47	61,47
Gilpin	161,216	72,824	258,356	1	1	38	6	6,61	251,30	40,50
Lake	216,192	23,280	239,472	1	1	21	3	.....	97,14	178,51
Couray	89,552	5,764	95,316	1	1	2	2	.....	78,17	220,63
Park	660,344	202,088	862,028	2	2	101	9	3,03	152,95	346,98
San Diego	247,233	88,659	335,899	1	1	18	11	.....	152,95	129,79
San Juan	44,732	2,400	31,984	1	1	5	23	4,04	2,98	54,43
Summit	200,224	7,200	209,594	1	1	6	7	22,36	12,64	31,27
Teller	720,224	290,504	1,017,928	2	2	108	11	2,78	3,44	88,48
All other ²	202,768	22,958	281,263	1	1	15	20	.....	73,98	37,87
Total	2,813,085	67,370	3,822,568	3	11	357	9	2,84	126,91	133,59
Idaho:									3,18	57,32
Boise	61,528	51,066	114,214	3	3	3	12	.....	48,76	176,17
Bonner	89,120	120	101,860	2	1	2	3	.....	22,44	29,45
Elmore	194,880	42,560	237,440	4	4	25	29	20,53	128,28	122,14
Idaho	160,693	174,874	343,567	10	10	10	12	.....	62,23	93,98
Lemhi	45,296	31,260	76,556	1	1	1	1	.....	62,23	68,62
Shoshone	2,893,016	685,370	3,578,626	4	4	264	31	1,38	91,25	31,99
Valley	106,712	23,080	129,792	10	10	10	13	.....	93,71	45,23
All other ⁴	263,652	137,702	403,354	1	1	15	28	3,79	56,89	129,98
Total	3,814,897	15,960 ¹	4,989,429	9	329	1	73	403	86,24	62,66
Michigan:									1,80	63,01
Dickinson	383,792	280,920	664,712	10	2	10	2	.....	26,06	7,12
Gogebic	1,191,736	982,665	2,233,669	43	2	43	51	1,08	36,08	6,11
Iron	653,041	436,498	1,089,479	14	14	14	14	.....	21,44	6,11
Marquette	912,079	32,181	500,729	13	13	13	1	.....	14,25	2,00
All other ⁵	3,043,537	67,063 ³	3,104,477	6,215	3	212	235	.99	69,66	14,91
Total	6,184,185	218,511 ⁵	3,305,229 ¹¹	707	925	292	3	.81	47,22	13,73

¹ Includes Apache, Coconino, Graham, Greenlee, Maricopa, Santa Cruz, and Yuma Counties.
² Includes Alameda, Alpine, Contra Costa, Del Norte, Fresno, Humboldt, Imperial, Kings, Lake, Lassen, Los Angeles, Madera, Merced, Modoc, Monterey, Napa, Orange, San Benito, San Diego, Santa Clara, Sonoma, Tulare, and Ventura Counties.
³ Includes Chaffee, Custer, Delta, Fremont, Garfield, Grand, Gunnison, Hinsdale, Jefferson, Larimer, La Plata, Mesa, Moffat, Pitkin, Rio Blanco, Rio Grande, Routt, Saginaw, and San Miguel Counties.
⁴ Includes Ada, Adams, Benewah, Bear Lake, Benewah, Blaine, Bonneville, Boundary, Butte, Camas, Caribou, Cassia, Clark, Clearwater, Custer, Gem, Kootenai, Jerome, Latah, Lewis, Nez Perce, Owyhee, and Owyhee Counties.
⁵ Includes Baraga, Houghton, Iosco, Kent, Keweenaw, and Wayne Counties.

New Mexico:																
Grant.....	184, 146	357, 312	267, 864	809, 322				18	9	53			14, 19	50, 38	33, 60	65, 49
Hidalgo.....	10, 376		3, 560	13, 036												
Taos.....	109, 128		4, 032	123, 160				17	3	20			155, 78	213, 80	162, 39	
All other ¹	1, 552, 028	17, 016	301, 216	1, 870, 260				72	8	80		64	53	46, 39	26, 56	42, 77
Total.....	1, 855, 678	374, 328	536, 672	2, 816, 678	1			115	20	153		54	.36	61, 97	34, 09	54, 32
New York:																
Elrie.....	224, 209		7, 672	231, 881				1	1	2			4, 31	4, 46	130, 34	8, 63
Genesee.....	120, 351		3, 026	123, 380					3	3					24, 32	24, 93
St. Lawrence.....	317, 319	1, 760	99, 224	415, 103				16	16	16			10, 08	2, 39	38, 27	38, 27
All other ¹⁰	848, 990	20, 146	299, 136	668, 272				16	2	19				45, 85	6, 69	28, 43
Total.....	1, 010, 669	21, 906	409, 061	1, 441, 636	1			36	1	3			2, 44	1, 39	35, 62	45, 65
Oregon:																
Baker.....	53, 695		32, 468	86, 063												
Jackson.....	19, 536		80, 951	100, 487					4	4						
Josephine.....	11, 696		35, 800	47, 496					4	4						
All other ¹¹	91, 948		62, 802	154, 350				4	5	9						
Total.....	176, 375		212, 021	388, 396				4	13	17					61, 31	43, 77
Texas:																
Brewster.....	274, 928	73, 200	60, 800	335, 728				13	6	19						
Uvalde.....	11, 997	44, 848	2, 838, 172	2, 892, 017				2	2	78			.71	.69	83, 35	89, 19
All other ¹²	286, 925	120, 048	2, 934, 052	3, 341, 025				14	8	92			.68	.60	48, 79	66, 64
Total.....	673, 850	238, 096	5, 432, 950	6, 113, 770				29	16	89					98, 68	165, 02
Utah:																
Juab.....	159, 630	2, 864	19, 974	182, 468				24	3	27						
Salt Lake.....	1, 586, 976	797, 192	748, 256	3, 130, 424				239	2	10			6, 26		150, 20	147, 97
Summit.....	1, 047, 528		164, 520	1, 212, 048				120	10	130					13, 40	80, 18
Utne.....	129, 048		74, 079	203, 120				2	3	5					61, 15	107, 35
Wasatch.....	815, 531		297, 659	1, 032, 210				151	11	162					40, 50	24, 62
All other ¹³	39, 356	141, 744	63, 684	46, 608				3	3	3					46, 48	153, 96
Total.....	3, 894, 813	941, 209	1, 311, 437	6, 147, 450	6			615	3	40			1.54	1.53	3, 19	30, 50
Other States ¹⁴ :																
United States.....	10, 494, 108	2, 957, 459	5, 942, 909	19, 394, 458	11			14	122	161			.50	.72	58, 60	41, 25
Total.....	52, 475, 371	8, 511, 019	31, 051, 936	92, 038, 326	88			3, 920	847	5, 014			1.08	.23	74, 70	29, 02
Notes:																
¹ Includes Cass, Cole, Dent, Franklin, Newton and Washington Counties																
² Includes Broadwater, Deer Lodge, Fergus, Gallatin, Jefferson, Lewis and Clarke, Lincoln, Meagher, Mineral Park, Powell, Sanders, and Stillwater Counties.																
³ Includes Churchill, Douglas, Esmeralda, Eureka, Humboldt, Lander, Lincoln, Lyon, O'Fallon, Ormsby, Storey, and Washoe Counties.																
⁴ Includes Carson, Colfax, Eddy, Guadalupe, Lincoln, Laramie, Otero, Elko, Archa, Snake Valley, San Miguel, Santa Fe, Sierra, Socorro, and Valencia Counties.																
⁵ Includes Clifton, Hermker, Lewis, Livingston, Monroe, O'Neill, Oquirrh, Toiyabe, Tomba, Wagon Wheel, and Westchester Counties.																
⁶ Includes Coos, Crook, Curry, Douglas, Grant, Harney, Lake, Lincoln, Malheur, Marion, and Wheeler Counties.																
⁷ Includes Brazoria, Brooks, Duval, Fort Bend, Fisher, Harmon, Matagorda, Nolan, and Wharton Counties.																
⁸ Includes Beaver, Box Elder, Cache, DeWitt, Iron, Pulte, San Juan, Sevier, Tooele and Washington Counties.																
⁹ Includes Alabama, Arkansas, Connecticut, Florida, Georgia, Illinois, Iowa, Kansas, Kentucky, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, South Dakota, Tennessee, Vermont, Virginia, Washington, Wisconsin, and Wyoming.																

⁶ Includes Cass, Cole, Dent, Franklin, Newton and Washington Counties
⁷ Includes Broadwater, Deer Lodge, Fergus, Gallatin, Jefferson, Lewis and Clarke, Lincoln, Meagher, Mineral Park, Powell, Sanders, and Stillwater Counties.
⁸ Includes Churchill, Douglas, Esmeralda, Eureka, Humboldt, Lander, Lincoln, Lyon, O'Fallon, Ormsby, Storey, and Washoe Counties.
⁹ Includes Carson, Colfax, Eddy, Guadalupe, Lincoln, Laramie, Otero, Elko, Archa, Snake Valley, San Miguel, Santa Fe, Sierra, Socorro, and Valencia Counties.
⁵ Includes Clifton, Hermker, Lewis, Livingston, Monroe, O'Neill, Oquirrh, Toiyabe, Tomba, Wagon Wheel, and Westchester Counties.
⁶ Includes Coos, Crook, Curry, Douglas, Grant, Harney, Lake, Lincoln, Malheur, Marion, and Wheeler Counties.
⁷ Includes Brazoria, Brooks, Duval, Fort Bend, Fisher, Harmon, Matagorda, Nolan, and Wharton Counties.
⁸ Includes Beaver, Box Elder, Cache, DeWitt, Iron, Pulte, San Juan, Sevier, Tooele and Washington Counties.
⁹ Includes Alabama, Arkansas, Connecticut, Florida, Georgia, Illinois, Iowa, Kansas, Kentucky, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, South Dakota, Tennessee, Vermont, Virginia, Washington, Wisconsin, and Wyoming.

OUTSTANDING ACCIDENT-FREE RECORDS

While the accident-frequency rates and accident-severity rates for the mining industry as a whole are higher than those for quite a few other industries many individual mining companies operate their properties from year to year with consistently low accident rates. Within the past few years a number of mines have reported operation for an entire year without a fatality or a nonfatal injury that caused loss of time to an employee. In a few mines the period of operation without a lost-time accident has been considerably longer than a year.

Table 30 contains the names of mines that were awarded certificates of honor by the Joseph A. Holmes Safety Association for operating without a fatal or nonfatal lost-time injury to an employee during the periods shown in the table. The list is limited to the most outstanding accident-free records that came to the attention of the Joseph A. Holmes Safety Association and is not presented as an exhaustive list of meritorious cases.

TABLE 30.—*Outstanding safety records*

[Mines that were operated without a fatal or lost-time injury to an employee and received awards from the Joseph A. Holmes Safety Association]

UNDERGROUND MINES

Period covered		Man-hours worked	Company	Name of mine	Location			Principal mineral produced
From	To				Town	County	State	
Sept. 21, 1931	Dec. 31, 1932	617, 907	Alpha Portland Cement Co.	Ironton	Lawrence	Ohio	Limestone.	
Mar. 14, 1931	Mar. 1, 1933	541, 185	Electro-Metallurgical Co.	Alloy	Fayette	West Virginia	Coal.	
Jan. 7, 1931	Aug. 31, 1932	531, 382	Youngstown Mines Corporation	Dehue	Logan	do	Do.	
Mar. 20, 1931	July 8, 1932	509, 232	Stonega Coke & Coal Co.	Imboden	Wayne	Virginia	Do.	
Aug. 6, 1930	Dec. 31, 1932	490, 986	Hanna Iron Ore Co.	Iron River	Iron	Michigan	Iron ore.	
May 19, 1930	do	417, 301	Cleveland-Cliffs Iron Co.	Gwynn	Marquette	do	Do.	
Dec. 22, 1931	Nov. 15, 1932	416, 000	Rockhill Coal & Iron Co.	Rockhill No. 9	Huntingdon	Pennsylvania	Coal.	
July 3, 1931	Dec. 31, 1932	410, 243	Avery Salt Co.	Avery	do	do	Salt.	
Aug. 31, 1932	Dec. 9, 1932	312, 925	Philadelphia & Reading Coal & Iron Co.	Hammond	Schuylkill	Pennsylvania	Coal.	
Dec. 14, 1931	Jan. 31, 1933	279, 393	Davis Coal & Coke Co.	Orenda	Somerset	do	Do.	
Jan. 4, 1931	Jan. 9, 1933	250, 732	Consumers Mining Co.	Steenbenville	Jefferson	Ohio	Do.	
Jan. 14, 1931	Jan. 14, 1933	182, 212	Townsite Mining Co.	Townsite	Gogebic	Michigan	Iron ore.	
Jan. 1, 1932	Dec. 31, 1932	146, 589	Weyanoke Coal & Coke Co.	Weyanoke	Mercer	West Virginia	Coal.	
Oct. 1, 1931	do	144, 925	Black Diamond Coal Mining Co.	Messboro	Shelby	Alabama	Do.	

OPEN-CUT MINES

May 1, 1930	Dec. 31, 1932	842, 877	Mahoning Ore & Steel Co.	Mahoning	St. Louis	Minnesota	Iron ore.
June 1, 1928	do	621, 029	Bennett Mining Co.	Bennett	Itasca	do	Do.
Dec. 28, 1929	do	547, 504	Plymouth Mining Co.	Plymouth	Gogebic	Michigan	Do.
Aug. 1, 1929	do	387, 933	Sagamore Ore Mining Co.	Sagamore	Crow Wing	Minnesota	Do.
Jan. 1, 1930	do	275, 161	Cuyama Ore Co.	do	do	do	Do.
Jan. 1, 1928	do	228, 033	Richmond Iron Co.	Palmer	Marquette	Michigan	Do.
Dec. 14, 1929	do	211, 410	Cleveland-Cliffs Iron Co.	Isperming	do	do	Do.



