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**METAL- AND NONMETAL-MINE  
ACCIDENTS**

IN THE  
**UNITED STATES**

**DURING THE CALENDAR YEAR 1939**  
(EXCLUDING COAL MINES)

BY

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# METAL- AND NONMETAL-MINE ACCIDENTS IN THE UNITED STATES DURING THE CALENDAR YEAR 1939<sup>1</sup> (EXCLUDING COAL MINES)

By W. W. ADAMS<sup>2</sup> AND M. E. KOLHOS<sup>3</sup>

## INTRODUCTION

Increased employment and a lower accident-frequency rate were the outstanding features of the metal- and nonmetal-mining<sup>4</sup> industries of the United States in 1939 compared with 1938, according to reports furnished by individual mining companies to the Bureau of Mines, United States Department of the Interior. Except for 1937, the reports for 1939 showed gains both in number of employees and number of man-hours worked over all years since 1929. The accident-frequency rate per million man-hours of exposure to mining hazards was lower than in any year since 1935.

Reports for 1939 revealed a total of 111,909 men employed in and about mines, an increase of more than 8 percent over 1938. The total volume of labor performed at all mines was slightly more than 206 million man-hours, an increase of more than 10 percent over 1938. As these gains suggest, the average employee had a longer period of work in 1939, the increase amounting to 5 workdays per employee.

Accidents at the mines resulted in the death of 173 employees and in nonfatal injuries to 13,710. All of the injuries were of the class known as lost-time or disabling injuries, which signifies that each employee was disabled for more than the remainder of the day on which the accident occurred. When the number of accidents was related to the total number of man-hours of employment at all mines during 1939, the reports showed that fatal accidents occurred at a rate of 0.84 per million man-hours worked and that nonfatal injuries occurred at the rate of 66.28 per million man-hours worked. For each fatality the average number of nonfatal injuries was 79. The injury rate of 66.28 for 1939 represented a slight improvement (2 percent) compared with the rate of 67.61 for 1938.

By far the chief cause of accidents in 1939 that resulted in the death of mine workers was falls of rock or ore from the roof or wall underground. Accidents of this class caused 51 deaths of a total of 173 deaths from all causes. Ranking second were accidents due to underground employees falling down chutes, winzes, raises, or stopes, excluding accidents in which employees fell down shafts or slopes open to the surface. Accidents from explosives and those connected with

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<sup>4</sup> Excluding coal mining.

underground haulage equipment ranked third and fourth, respectively, among the principal causes of fatal accidents during the year. In all, 130 employees were killed by underground accidents, exclusive of shaft accidents; 17 employees were killed by shaft accidents; 16 were killed by accidents in open-pit mines; and 10 were killed by accidents among men working above ground.

Among the various States in which metal mines and nonmetallic-mineral mines were in operation in 1939, California had the largest number of employees, with 15,087 men working at the mines. In frequency of fatal accidents per million man-hours worked, California ranked third among States in which the mining industry employed 1,000 or more men. According to the frequency of nonfatal injuries per million man-hours worked, California ranked sixteenth among the important mining States. Texas, which ranked sixteenth in number of employees, ranked first in fatality rate and seventh in injury rate. Minnesota ranked first in injury rate, seventh in fatality rate, and fifth in number of men employed at the mines. (See tables 1 and 2.)

TABLE 1.—*Relative standing of States having 1,000 or more men employed at mines in 1939, classified according to the 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 <sup>1</sup>	Relative standing	State	Injury rate <sup>1</sup>
1	California .....	15,087	1	Texas .....		1	Minnesota .....	10.83
2	Arizona .....	9,812	2	Oklahoma .....	0.25	2	Alabama .....	17.35
3	Montana .....	9,644	3	California .....	.39	3	Michigan .....	22.53
4	Michigan .....	8,814	4	Alaska .....	.44	4	Florida .....	22.97
5	Minnesota .....	6,537	5	Florida .....	.48	5	Tennessee .....	27.80
6	Colorado .....	6,405	6	Oregon .....	.48	6	New Jersey .....	39.01
7	Idaho .....	6,280	7	Minnesota .....	.54	7	Texas .....	41.70
8	Nevada .....	5,787	8	Michigan .....	.59	8	Missouri .....	41.86
9	Alaska .....	5,537	9	Arizona .....	.60	9	New York .....	45.24
10	Utah .....	5,196	10	South Dakota .....	.78	10	South Dakota .....	46.01
11	Alabama .....	4,622	11	Utah .....	.88	11	Alaska .....	48.69
12	New Mexico .....	2,914	12	Washington .....	.91	12	Oklahoma .....	68.23
13	Missouri .....	2,694	13	Idaho .....	.96	13	Washington .....	68.38
14	Oklahoma .....	2,497	14	New Jersey .....	.96	14	Arizona .....	70.03
15	South Dakota .....	2,197	15	New York .....	1.01	15	Kentucky .....	72.34
16	Texas .....	1,673	16	Montana .....	1.18	16	California .....	81.56
17	Tennessee .....	1,640	17	Alabama .....	1.18	17	Kansas .....	86.92
18	Kansas <sup>2</sup> .....	1,536	18	Missouri .....	1.19	18	Montana .....	88.25
19	Oregon .....	1,501	19	Tennessee .....	1.24	19	Utah .....	88.29
20	New York .....	1,446	20	Kentucky .....	1.40	20	Oregon .....	88.95
21	Washington .....	1,302	21	Colorado .....	1.51	21	Nevada .....	92.33
22	New Jersey .....	1,055	22	New Mexico .....	1.57	22	New Mexico .....	97.23
23	Florida .....	1,041	23	Nevada .....	1.69	23	Colorado .....	99.36
24	Kentucky .....	1,004	24	Kansas <sup>2</sup> .....	2.29	24	Idaho .....	142.85
	United States total .....	111,909		United States average .....	0.84		United States average .....	66.28

<sup>1</sup> Number of deaths or injuries per million man-hours of exposure.

<sup>2</sup> Major disaster, Jan. 31, 1939, in which 5 lives were lost.

### ACKNOWLEDGMENTS

As accident-prevention programs can be conducted most efficiently and economically through an intensive study of accidents that have occurred in the past, the Bureau of Mines gratefully acknowledges the cooperation of mining companies who have voluntarily furnished the



reports of accidents and employment that formed the basis of the statistical tables presented in this bulletin. No Federal law requires that operators submit such reports to the Bureau; however, by so doing the mining companies contribute substantially to the promotion of safety in the mining industry of the United States.

Grateful acknowledgment is made also to the mining officials of Alaska, Arizona, and Idaho for the collection of reports for mines in those States.

### RELATION OF STATISTICS TO CALENDAR YEAR

This and other statistical reports published regularly by the Bureau of Mines relate to calendar years. The data contained herein are intended to show the number of deaths and injuries resulting from accidents that occurred during the calendar year 1939. For accident-prevention studies it is believed that accidents should be charged to the year in which they occurred so that they may be examined in connection with the causes and conditions that produced them.

### SCOPE OF STATISTICS

The tables in this paper are based upon reports covering 9,123 mines that were operated all or part of 1939. Data for mines in Alaska were furnished by the Territorial mine inspector; figures for all States were received directly from the operating companies, except those for Arizona and Idaho, which were received from the companies through the offices of the State mine officials. Reports cover mines employing any men, whether the mines were productive or nonproductive; many prospects also are included, but many others are omitted as it is impossible to obtain complete reports by mail.

### CLASSIFICATION OF INJURIES

Statistics of accidents and employment 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. From 1915 to 1929, inclusive, a "serious" injury, as used in Bureau reports, signified, in addition to a permanent disability, a temporary injury that disabled an employee more than 14 days. Beginning with 1930 all temporary injuries have been included in a single group, which comprises all temporary injuries causing disability for more than the remainder of the day on which the accident occurred.

### CLASSIFICATION OF MINES

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

*Copper mines.*—This group comprises all 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 Mississippi 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 that produce asbestos, asphaltum, barite, borax, emery, feldspar, fluorspar (except in Illinois and Kentucky), garnet, graphite, gypsum, lithia, magnesite, mica, mineral paint, phosphate rock, quartz, salt, soapstone, sulfur, talc, and tripoli. Coal mines are not included, and the records do not cover properties that produce stone, clay, or sand and gravel.

#### ACCIDENT STATISTICS, BY STATES AND CAUSES

Tables 3 to 10 show the number and causes of accidents at metal and nonmetal mines in each of the States in which three or more companies reported operations in 1939. The tables also show the number of men employed at the mines, the number of days the mines were active, and the number of man-hours worked.

TABLE 2.—All mines: Number of active mines, men employed, man-days, man-hours of employment, and number killed and injured, by kind of mine, during the year ended Dec. 31, 1939

Kind of mine	Number of operators		Men employed				Man-days of employment				Averages hours of employment per man per day				Man-hours of employment			
	Number of operators	Number of mines	Open-cut		Underground		Open-cut		Underground		Open-cut		Underground		Open-cut		Underground	
			Surface	Total	Surface	Total	Surface	Total	Surface	Total	Surface	Total	Surface	Total	Surface	Total		
Copper.....	69	93	10,783	3,168	4,485	18,436	2,636,678	983,311	1,335,335	5,255,324	8.02	8.00	8.00	8.01	23,550,141	7,866,488	10,681,233	42,097,862
Iron.....	168	219	11,437	4,423	3,909	19,769	2,620,556	887,812	942,339	4,490,727	8.01	8.07	7.99	8.02	20,998,807	7,168,053	7,527,382	35,694,242
Lead and zinc (Mississippi Valley).....	150	204	6,616	45	576	7,237	1,419,497	13,500	132,039	1,565,036	7.95	8.00	7.98	7.95	11,286,291	108,000	1,054,018	12,448,309
Gold, silver, and miscellaneous.....	(1)	7,821	83,945	3,368	19,524	56,837	8,102,681	514,157	3,948,515	12,565,353	7.89	7.99	7.93	7.90	63,895,644	4,106,428	31,311,472	99,313,544
Gold, silver: Lode.....	23,784	4,174	30,721	833	6,885	38,439	7,350,830	182,916	1,728,543	9,282,289	7.88	8.30	7.82	7.88	57,957,077	1,534,607	13,524,864	73,016,548
Gold: Placer.....	(1)	3,394	795	1,834	12,146	14,775	154,463	201,650	2,060,383	2,432,496	8.02	7.80	8.01	8.01	1,269,731	1,572,982	16,813,687	19,656,400
Miscellaneous.....	241	253	2,429	701	493	3,623	597,388	129,891	123,389	850,368	7.82	7.71	7.87	7.81	4,668,836	998,839	972,921	6,640,596
Nonmetal.....	739	786	2,635	4,077	2,918	9,630	579,238	745,099	871,591	2,195,928	7.90	8.09	7.66	7.87	4,576,948	6,030,125	6,674,093	17,281,166
Total, 1939.....	77,828	9,123	65,416	15,081	31,412	111,909	15,658,650	3,143,879	7,229,539	26,032,368	7.94	8.04	7.92	7.95	124,307,831	25,279,094	57,248,198	206,835,123
Total, 1938.....	(1)	7,233	61,794	13,253	27,980	103,027	14,242,465	2,641,243	6,622,156	23,505,804	7.98	8.10	8.02	8.01	113,677,308	21,393,917	53,098,941	188,170,166

1 Excludes Alaska.

1 Not available.

TABLE 2.—All mines: Number of active mines, men employed, man-days, man-hours of employment, and number killed and injured, by kind of mine, during the year ended Dec. 31, 1939—Continued

Kind of mine	Average days active			Average hours per man per year			Number killed			Number injured			Orphans			Widows			Rates per million man-hours					
																			Killed			Injured		
	Underground	Surface	Total	Underground	Surface	Total	Underground	Surface	Total	Underground	Surface	Total	Underground	Surface	Total	Underground	Surface	Total	Underground	Surface	Total	Underground	Surface	Total
Copper.....	272	310	298	2,184	2,483	2,283	34	3	38	2,074	209	198	2,481	20	25	1.44	0.38	0.90	88.07	26.57	18.54	88.07	26.57	58.93
Iron.....	229	201	241	1,836	1,621	1,806	19	3	23	487	82	33	602	13	9	.90	.42	.64	23.19	11.44	4.38	23.19	11.44	16.87
Lead and zinc (Mississippi Valley).....	215	300	229	1,706	2,400	1,720	15	7	15	660	11	55	726	10	9	1.33	1.70	1.20	58.48	101.85	52.18	58.48	101.85	58.32
Gold, silver, and miscellaneous.....	239	153	202	1,882	1,219	1,604	74	7	87	7,684	160	1,338	9,182	38	72	1.16	1.19	.88	120.26	38.96	42.73	120.26	38.96	92.45
Gold, silver, Lode.....	239	220	251	1,887	1,842	1,900	68	5	74	7,224	92	679	7,995	32	67	1.17	3.26	.07	124.64	59.95	50.20	124.64	59.95	109.50
Gold, Placer.....	194	110	173	1,597	858	1,384	1	1	4	6	35	27	626	3	1	.79	.64	.24	27.56	17.16	37.23	27.56	17.16	35.00
Miscellaneous.....	246	185	251	1,922	1,425	1,833	5	1	7	425	41	33	499	3	4	1.07	1.00	1.03	91.03	41.05	33.92	91.03	41.05	75.14
Nonmetal.....	220	183	209	1,737	1,479	1,795	5	3	10	279	229	211	719	7	17	1.09	.50	.58	60.96	37.98	31.61	60.96	37.98	41.61
Total, 1939.....	239	208	230	1,900	1,676	1,822	147	16	173	11,184	691	1,835	13,710	88	132	1.18	.63	.17	89.97	27.33	32.05	89.97	27.33	66.28
Total, 1938.....	230	199	237	1,840	1,614	1,808	139	11	166	10,437	670	1,615	12,722	87	139	1.22	.51	.11	91.81	31.32	30.41	91.81	31.32	67.61

TABLE 3.—All mines: Number of active mines, men employed, man-days of employment, and man-hours of employment, by States, during the year ended Dec. 31, 1939

State	Num-ber of oper-a-tors	Num-ber of mines	Men employed			Man-days of employment			Man-hours of employment			Total		
			Under-ground	Open-cut	Surface	Total	Under-ground	Open-cut	Surface	Total	Under-ground		Open-cut	Surface
Alabama.....	61	74	3,526	635	461	4,622	804,745	120,763	125,473	1,050,981	6,436,738	1,031,055	1,003,782	8,471,575
Alaska.....	(1)	595	1,166	871	3,500	5,537	308,636	87,973	727,804	1,244,413	2,469,088	703,784	5,822,432	8,995,304
Arizona.....	1,079	1,036	6,036	1,188	2,588	9,812	1,550,185	364,075	607,670	5,291,920	2,469,088	2,902,568	4,859,222	20,147,133
Arkansas.....	926	19	409	1,382	92	633	1,580,580	25,565	18,917	1,291,062	635,910	204,520	1,529,398	992,922
California.....	1,081	2,038	7,851	1,044	1,832	15,087	1,986,254	174,880	1,399,063	3,560,177	1,399,063	1,395,261	28,421,323	28,421,323
Colorado.....	1,035	1,241	4,416	1,331	1,858	6,405	1,094,640	21,124	309,847	1,425,611	8,633,926	1,447,601	11,242,882	11,242,882
Florida.....	24	20	673	673	1,041	1,041	149,377	368	103,357	252,734	5,588	259,164	2,090,061	2,090,061
Georgia.....	48	50	61	170	69	300	9,843	32,019	9,726	51,588	79,191	256,164	81,548	416,903
Idaho.....	828	844	4,180	267	1,833	6,280	990,600	40,299	312,188	3,845,659	7,784,602	2,344,099	4,189,748	10,451,382
Illinois.....	33	33	272	91	43	7	51,302	25,364	8,963	83,689	400,400	302,712	717,939	10,451,382
Iowa.....	9	9	112	15	7	134	23,192	3,411	1,391	27,994	177,556	27,288	215,848	215,848
Kansas.....	29	41	1,387	31	118	1,536	304,349	3,701	22,184	330,234	4,418,007	29,608	175,589	2,623,204
Kentucky.....	40	40	543	312	149	1,004	93,996	50,523	32,835	177,354	754,179	401,273	268,431	1,423,883
Louisiana.....	5	5	137	304	304	441	34,719	10,230	108,231	142,950	250,411	401,273	845,543	1,104,954
Maine.....	47	58	5,893	324	597	8,814	1,425,171	49,579	638,582	2,113,332	11,494,523	82,814	17,002,750	82,814
Michigan.....	42	56	2,123	3,229	1,185	6,537	472,565	634,483	290,437	1,397,485	3,780,528	5,076,136	5,111,681	17,002,750
Minnesota.....	36	70	2,037	575	82	2,694	429,021	87,188	12,803	529,012	3,406,089	696,780	102,087	4,204,956
Missouri.....	104	104	7,399	115	1,530	9,644	1,619,451	13,785	488,994	2,122,230	12,883,318	112,546	3,910,777	16,906,641
Montana.....	544	579	3,509	763	1,515	5,787	1,889,656	184,941	365,599	1,440,196	6,893,137	1,469,985	2,901,256	11,264,378
Nevada.....	674	697	3,509	763	1,515	5,787	1,889,656	17,111	7,330	24,441	24,441	137,968	59,445	197,413
New Hampshire.....	25	25	869	113	186	1,055	213,385	17,111	46,145	259,530	1,709,112	367,394	2,076,506	2,076,506
New Jersey.....	4	6	1,733	625	556	2,914	376,156	49,579	111,827	652,539	2,884,521	1,315,704	880,276	5,080,501
New Mexico.....	162	169	1,164	35	247	1,446	297,854	164,556	73,499	377,911	2,344,099	55,768	584,024	2,983,891
New York.....	22	29	1,159	317	53	529	33,166	39,891	12,109	85,166	295,032	319,129	96,872	881,033
North Carolina.....	171	174	1,591	317	53	529	442,339	23,657	34,748	500,744	3,520,174	189,257	277,074	3,986,505
Oklahoma.....	43	66	2,193	168	136	2,497	442,339	35,080	123,547	290,432	858,987	233,585	987,244	2,079,819
Oregon.....	274	274	478	334	689	1,501	121,805	73,239	25,526	167,439	554,079	584,238	198,775	1,337,062
Pennsylvania.....	9	11	211	221	86	518	68,674	73,239	3,217	44,443	44,265	370,120	28,503	442,888
South Carolina.....	8	8	22	109	13	147	4,039	37,187	37,187	13,258	44,265	370,120	28,503	442,888
South Dakota.....	142	155	1,316	120	761	2,197	405,140	16,657	215,079	636,876	3,257,474	133,258	5,107,571	5,107,571
Tennessee.....	33	39	665	510	1,465	1,673	173,323	110,327	120,732	404,382	885,465	3,257,474	3,257,474	3,257,474
Texas.....	25	29	364	160	149	670	101,886	38,422	383,841	524,149	3,181,518	311,883	2,785,929	3,499,308
Utah.....	153	185	3,201	1,046	949	5,196	787,077	365,074	272,260	1,424,411	6,262,944	2,919,302	11,360,761	11,360,761
Vermont.....	5	6	32	82	42	156	6,927	13,892	6,696	27,455	55,417	110,658	53,566	219,641
Virginia.....	42	46	439	272	287	998	100,159	59,849	72,175	232,163	795,239	465,633	575,598	1,886,470
Washington.....	174	183	728	194	380	1,302	166,500	40,663	171,820	278,983	1,311,116	325,304	571,971	2,208,391
Wisconsin.....	6	6	551	188	188	739	139,898	48,116	48,116	188,014	1,098,627	380,031	1,478,798	1,478,798
Wyoming.....	47	48	143	47	101	291	27,578	8,717	16,657	52,952	69,733	118,592	33,380	423,691
Other States <sup>2</sup> .....	16	16	91	72	5	168	19,859	13,799	420	34,078	158,871	118,592	3,380	280,843
Total, 1939.....	7,828	9,134	65,416	15,081	31,412	111,909	15,658,650	3,143,879	7,229,839	26,032,368	124,307,831	25,279,094	57,248,198	206,835,123
Total, 1938.....	(1)	7,233	61,794	13,253	27,980	103,027	14,242,465	2,641,243	6,622,156	23,505,864	113,677,308	21,393,917	53,098,941	188,170,166

<sup>2</sup> Includes Connecticut, Maryland, Massachusetts, Nebraska, Ohio, and West Virginia.

<sup>1</sup> Not available.

8 METAL- AND NONMETAL-MINE ACCIDENTS IN THE U. S.—1939

TABLE 4.—All mines: Average length of workday (hours), average days active, average hours per man per year, by States, during the year ended Dec. 31, 1939

State	Average length of work-day (hours)				Average days active				Average hours per man per year			
	Underground	Open-cut	Surface	Total	Underground	Open-cut	Surface	Total	Underground	Open-cut	Surface	Total
Alabama	8.00	8.54	8.00	8.06	228	190	272	227	1,826	1,624	2,177	1,833
Alaska	8.00	8.00	8.00	8.00	265	101	208	203	2,118	808	1,664	1,625
Arizona	7.99	7.97	8.00	7.99	257	306	235	257	2,052	2,443	1,878	2,053
Arkansas	7.52	8.00	8.06	7.69	207	194	206	204	1,555	1,549	1,657	1,568
California	7.99	7.98	7.97	7.98	253	167	226	236	2,022	1,336	1,800	1,884
Colorado	7.89	7.64	7.90	7.89	248	161	167	223	1,955	1,232	1,317	1,755
Florida		8.43	8.04	8.27		222	281	243		1,871	2,257	2,008
Georgia	8.05	8.00	8.38	8.08	161	188	141	172	1,298	1,507	1,182	1,390
Idaho	7.86	8.01	7.51	7.78	237	151	170	214	1,862	1,209	1,279	1,664
Illinois	7.80	8.03	8.00	7.89	189	279	209	211	1,472	2,239	1,673	1,665
Iowa	7.66	8.00	7.91	7.71	207	227	199	209	1,585	1,819	1,572	1,611
Kansas	7.94	8.00	7.92	7.94	219	119	188	215	1,743	955	1,488	1,708
Kentucky	8.02	7.94	8.18	8.03	173	162	220	177	1,389	1,286	1,802	1,418
Louisiana	7.47		7.81	7.73	253		356	324	1,894		2,781	2,506
Maine		8.10		8.10		114		114		920		920
Michigan	8.07	8.00	8.00	8.05	242	153	246	240	1,951	1,224	1,968	1,929
Minnesota	8.00	8.00	7.98	8.00	223	196	245	214	1,781	1,572	1,955	1,709
Missouri	7.94	7.99	7.97	7.95	211	152	156	196	1,672	1,212	1,245	1,561
Montana	7.96	8.16	8.00	7.97	219	120	230	220	1,741	979	1,836	1,753
Nevada	7.75	7.95	7.94	7.82	254	242	241	249	1,964	1,927	1,915	1,946
New Hampshire		8.06		8.08		151	262	173		1,221	2,123	1,400
New Jersey	8.01		7.96	8.00	246		248	246	1,967		1,975	1,968
New Mexico	7.67	8.00	7.87	7.79	217	263	201	224	1,664	2,105	1,583	1,743
New York	7.87	8.50	7.95	7.90	256	187	298	261	2,014	1,593	2,364	2,064
North Carolina	7.99	8.00	8.00	8.00	209	126	228	161	1,667	1,007	1,828	1,287
Oklahoma	7.96	8.00	7.97	7.96	202	141	256	201	1,605	1,127	2,037	1,597
Oregon	7.05	6.66	7.99	7.42	255	105	179	187	1,797	699	1,433	1,386
Pennsylvania	8.07	7.98	7.79	7.99	325	331	297	323	2,626	2,644	2,311	2,581
South Carolina	10.96	9.95	8.86	9.97	184	341	247	309	2,012	3,396	2,193	3,076
South Dakota	8.04	8.00	7.98	8.02	308	139	283	290	2,475	1,110	2,256	2,325
Tennessee	8.00	8.03	7.99	8.00	261	216	260	247	2,085	1,736	2,075	1,974
Texas	7.96	8.12	7.26	7.46	280	240	334	313	2,229	1,949	2,425	2,337
Utah	7.96	8.00	8.00	7.98	246	349	287	274	1,957	2,791	2,296	2,186
Vermont	8.00	8.00	8.00	8.00	216	169	159	176	1,732	1,349	1,275	1,408
Virginia	7.94	7.78	7.98	7.91	228	220	251	233	1,811	1,712	2,006	1,840
Washington	7.87	8.00	7.96	7.92	229	210	189	214	1,801	1,677	1,505	1,696
Wisconsin	7.85		7.90	7.87	254		256	254	1,994		2,021	2,001
Wyoming	8.00	8.00	8.00	8.00	193	185	165	182	1,543	1,484	1,320	1,456
Other States <sup>1</sup>	8.00	8.59	8.05	8.24	218	192	84	203	1,746	1,647	676	1,672
Total, 1939	7.94	8.04	7.92	7.95	239	208	230	233	1,900	1,676	1,822	1,848
Total, 1938	7.98	8.10	8.02	8.01	231	199	237	228	1,840	1,614	1,898	1,826

<sup>1</sup> Includes Connecticut, Maryland, Massachusetts, Nebraska, Ohio, and West Virginia.

TABLE 5.—All mines: Fatalities and injuries and rates per million man-hours, by States, during the year ended Dec. 31, 1939

State	Number killed			Number injured (time lost, 1 day or more)				Widows	Orphans	Rates per million man-hours								
	Underground	Open-cut	Surface	Total	Underground	Open-cut	Surface			Total	Killed				Injured			
											Underground	Open-cut	Surface	Total	Underground	Open-cut	Surface	Total
Alabama	9	1	1	10	135	10	2	147	5	9	1.40	1.00	1.18	20.97	9.70	1.99	17.35	
Alaska	3	1	4	244	2	192	438	(1)	(1)	1.22	1.42	.44	98.82	2.84	32.98	48.69		
Arizona	12	12	12	1,309	10	92	1,411	7	15	.97	.60	105.69	3.45	18.93	70.03			
Arkansas	8	1	2	11	1,805	61	452	2,318	6	7	.50	.18	20.44	4.89	13.12	16.12		
California	16	1	1	17	978	14	125	1,117	5	5	1.85	.41	113.29	86.72	51.07	99.36		
Colorado	1	1	1	1	28	20	48	1	5	.79	.48	22.23	24.07	22.97	22.97			
Florida	9	1	1	10	1,331	29	133	1,493	4	9	1.16	.43	37.88	15.61	61.31	28.78		
Georgia	13	13	9	2	13	9	2	24	26	170.98	89.87	56.74	142.85	35.50	27.80	120.46		
Illinois	6	6	6	216	2	10	228	5	4	2.48	2.29	89.33	67.55	56.95	86.92			
Iowa	2	2	2	60	31	12	103	3	2	6.65	1.40	79.56	77.25	44.70	72.34			
Kansas	1	1	1	20	14	14	34	34	34	77.10	77.10	16.56	30.77					
Kentucky	10	10	10	342	9	32	383	8	9	.87	.59	29.75	22.70	6.26	22.53			
Louisiana	3	3	6	64	50	7	121	3	5	.79	.59	16.93	9.85	3.02	10.83			
Maine	5	5	5	134	24	18	176	3	3	1.47	1.19	39.34	34.44	176.32	41.86			
Michigan	17	2	1	20	1,351	3	138	1,492	(1)	(1)	1.32	17.77	104.86	26.66	35.29	88.25		
Minnesota	18	1	19	810	101	129	1,040	10	23	2.61	1.69	117.51	68.71	44.46	92.33			
Missouri	1	1	1	10	1	1	11	11	11	.68	1.69	72.48	16.82	55.72	39.01			
Montana	2	2	2	81	81	81	81	81	1	1.17	.96	47.39	71.44	38.62	97.23			
Nebraska	6	2	8	366	94	34	494	5	11	2.08	1.52	126.88	71.44	38.62	97.23			
Nevada	3	3	3	120	5	10	135	2	5	1.28	1.01	51.19	89.66	17.12	45.24			
New Hampshire	1	1	1	21	3	4	28	1	1	.28	.25	79.24	9.40	41.29	41.11			
New Jersey	1	1	1	242	9	21	272	1	1	.28	.25	68.75	47.55	75.79	68.23			
New Mexico	1	1	1	130	6	49	185	1	1	.28	1.01	151.34	25.69	49.63	88.95			
New York	1	1	1	18	17	2	37	37	37	32.49	29.10	10.06	10.06	27.67	27.67			
North Carolina	4	4	4	196	2	3	235	3	9	1.23	.78	60.17	15.01	21.55	46.01			
Oklahoma	3	1	4	24	41	25	90	3	2	2.16	1.04	17.31	46.30	25.91	27.80			
Oregon	7	7	7	72	13	78	163	163	163	88.72	88.72	41.68	28.00	41.70	41.70			
Pennsylvania	6	3	1	10	819	49	135	1,003	5	7	.96	1.03	130.77	16.78	61.97	88.29		
South Carolina	2	1	3	3	2	10	15	2	7	18.07	8.67	13.66	54.14	18.07	186.69	68.29		
South Dakota	4	4	4	196	2	3	235	3	9	1.23	.78	60.17	15.01	21.55	46.01			
Tennessee	3	1	4	24	41	25	90	3	2	2.16	1.04	17.31	46.30	25.91	27.80			
Texas	7	7	7	72	13	78	163	163	163	88.72	88.72	41.68	28.00	41.70	41.70			
Utah	6	3	1	10	819	49	135	1,003	5	7	.96	1.03	130.77	16.78	61.97	88.29		
Vermont	2	1	3	3	2	10	15	2	7	18.07	8.67	13.66	54.14	18.07	186.69	68.29		
Virginia	1	1	1	46	15	24	87	87	87	60.36	.91	60.36	32.21	41.70	47.37			
Washington	2	2	2	122	18	11	151	1	1	1.53	.91	93.05	55.33	19.23	68.38			
Wisconsin	1	1	1	46	15	24	87	87	87	60.36	.91	60.36	32.21	41.70	47.37			
Wyoming	1	1	1	20	4	3	27	1	1	4.53	2.36	90.65	57.36	22.50	63.73			
Other States <sup>2</sup>	3	3	3	3	3	3	6	6	6	18.88	18.88	25.30	25.30	21.37	21.37			
Total, 1939	147	16	10	113	11,184	691	1,835	13,710	(1)	(1)	1.18	.63	.17	.84	89.97	27.33	32.05	66.28
Total, 1938	139	11	6	156	10,437	670	1,615	12,722	(1)	(1)	1.22	.51	.11	.83	91.81	31.32	30.41	67.61

<sup>1</sup>Not available. <sup>2</sup> Includes Connecticut, Maryland, Massachusetts, Nebraska, Ohio, and West Virginia.

TABLE 6.—All mines: Fatalities, by causes and States, during the year ended Dec. 31, 1939

State	Underground										Shaft													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total, underground	17	18	19	20	21	22	Total, shaft
	Fall of rock or ore from roof or wall	Rock or ore during 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 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	6			1		2	1										9							
Alaska					3												3							
Arizona	5			2	1	1	1		1							1	11	1						1
California	1			2	1	3										2	6	1				1		2
Colorado	2			2	1	3	2	1								3	14	1	1					2
Florida																								
Idaho				1		2						1				1	5			2				4
Kansas	6			1		1											6							
Kentucky				1		1				1						1	2							
Michigan	6	1		1		2											10							
Minnesota	1			1		1				1							3							
Missouri	1			1		2				1							5							
Montana	10			2		1		1		2						1	17							
Nebraska	4			4		3	1	2			1						16	2						2
New Jersey	1			2		1											5							1
New Mexico	1			2		2											5	1						1
New York	2															1	5							1
Oklahoma				1												1	1							
Oregon																	1							
South Dakota						1											2							2
Tennessee				1		1											3							3
Utah						2											3				1			
Vermont						1											2							
Washington						1											1							
Wisconsin																	2							
Wyoming																	1							
Total, 1939	51	1	1	16	13	24	4	4	1	4	2	2	2	2	3	10	130	10	7	2	2	2	2	17
Total, 1938	52			6	12	24	5	3	3		2	4			3	6	121	6	4	1	4	4	2	18



State	Open-cut										Surface										Grand total				
	Falls or slides of rock or ore	Explosives	Haulage	Power shovels	Falls of persons	Falls of derricks, booms, etc.	Run or fall of ore	Machinery	Electricity	Hand tools	Handling materials	Other causes	Total, open-cut	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 materials	Other causes	Total, surface
Alabama.....	1	2	3	4	5	6	7	8	9	10	11	12	1	1	2	3	4	5	6	7	8	9	10	1	10
Alaska.....																									
Arizona.....	1																								
California.....					1																				
Colorado.....																									
Florida.....									1																
Idaho.....																									
Kansas.....																									
Kentucky.....																									
Michigan.....								1																	
Minnesota.....																									
Missouri.....			1		1								3												
Montana.....					1								2								1				
New Jersey.....	1												1												
New Mexico.....	1												2												
New York.....											1	1													
North Carolina.....																									
Oklahoma.....																									
Oregon.....																									
South Dakota.....																									
Tennessee.....																									
Utah.....	3												3	1											
Vermont.....	2												2												
Washington.....																									
Wisconsin.....																									
Wyoming.....																									
Total, 1939.....	8	2	1	1	3			1	1	3	1	1	16	2	1	1	1	1	1	1	1	1	6	10	173
Total, 1938.....	3											3	11										2	6	136

TABLE 7.—All mines: Injuries by causes and States, during the year ended Dec. 31, 1939

State	Underground											Shaft													
	Fall of rock or ore from roof or wall	Rock ore during 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 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	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total, underground	17	18	19	20	21	22	Total, shaft	
Alabama	24	20	9	1	45	1	2	11							10	135								1	
Alaska	19	19	21	5	19	1	63	34	3	2	1		6		11	51							1	25	
Arizona	7	68	165	15	123	45	44	134	3	42		4	52		109	204	1,284	1	2			12	10	1	
Arkansas	3	3			3					1			1		4	4	12							1	
California	308	183	112	12	177	70	104	248	5	50		4	36		234	220	1,763	5	8			8	21	42	
Colorado	164	33	82	4	110	38	29	124	1	57			54		120	145	961	3	4				10	17	
Florida																									
Georgia	1		1												1	203	3	2	5	1	1	8	24	40	
Idaho	285	75	128	4	136	60	28	100	8	43		1	38		179	4	1,291								
Illinois	5	2			2	1				1					2	4	13								
Iowa	2	12			1										2	4	22						1	1	2
Kansas	40	47	3	3	63	3	4	17	4	4			3		10	17	214		2						
Kentucky	21	15	2		3	3		4	1				3		5	6	60								
Louisiana				2	1	1		3							3	10	20								
Maine																									
Michigan	112	38	18	7	21	10	5	29	4	13			2		18	52	329	3	3			1	6	13	
Minnesota	16	2	7	2	6	3		1		2			2		12	10	63							1	
Missouri	21	19	8	2	23	9		14	4	2			1		14	13	130		2			2	2	25	
Montana	358	46	77	10	154	54	69	108	56			2	36		180	176	1,326	1	10	1	1	11	2	25	
Nevada	200	33	68	3	98	33	10	59	2	47			25		101	106	791	3	4			5	7	19	
New Hampshire																									
New Jersey	10	5	2	3	6	4	3	10	2	2					18	16	79							2	
New Mexico	79	14	22	4	29	17	82	47	10	10		1	13		22	71	361		1			1	3	5	
New York	22	16	7	1	16	8	5	12	1	5			2		5	19	119					1	1	1	
North Carolina	4	1	1		3										6	20	6						1	1	
Oklahoma	43	53	11	3	44	5	5	27	4	4			4		11	21	231		3			5	3	11	
Oregon	29	13	5	3	8	3	8	33	4				6		2	22	129		1					1	
Pennsylvania	2	1	3	1	4	1	3	1					1		1	1	18								
South Carolina																									
South Dakota	16	40	9	1	34	2	1	16	6	2			2		44	190		1				2	3	6	
Tennessee	1	2			2	1	1	3	3	2			2		7	24									
Texas	2	19	2		16	1	1	13	4	4			3		6	70						2	2	2	





Utah.....	12	6	4	4	4	4	10	5	49	8	2	10	5	15	9	30	56	135	1,003
Vermont.....	1						1	1	2			1	1	1	3	3	10	15	
Virginia.....	2		1	1	2	1	3	6	15			6	1	1	6	7	4	24	87
Washington.....	1	5	3	3	3	2	3	1	18			5		1	1	1	3	11	151
Wisconsin.....																			46
Wyoming.....	1		1	1	1		1	2	4						1		1	3	27
Other States <sup>1</sup> .....							1		3										6
Total, 1939.....	77	7	64	36	90	2	68	3	691	95	33	291	48	223	241	407	449	1,835	13,710
Total, 1938.....	63	9	47	25	82	3	54	6	670	85	25	240	44	191	237	386	364	1,615	12,722

<sup>1</sup> Includes Connecticut, Maryland, Massachusetts, Nebraska, Ohio, and West Virginia.

16 METAL- AND NONMETAL-MINE ACCIDENTS IN THE U. S.—1939

TABLE 8.—All mines: Accidents, by States and severity of injury, during the year ended Dec. 31, 1939

State	Killed	Nonfatal				Grand total
		Perma- nent total <sup>1</sup>	Perma- nent partial <sup>2</sup>	Tempo- rary <sup>3</sup>	Total nonfatal	
Alabama	10	3	13	131	147	157
Alaska	4		4	434	438	442
Arizona	12		52	1,359	1,411	1,423
Arkansas			1	15	16	16
California	11	4	21	2,293	2,318	2,329
Colorado	17		20	1,097	1,117	1,134
Florida	1			48	48	49
Georgia			1	11	12	12
Idaho	10	1	39	1,453	1,493	1,503
Illinois				24	24	24
Iowa				26	26	26
Kansas	6		5	223	228	234
Kentucky	2		1	102	103	105
Louisiana			1	33	34	34
Maine						
Michigan	10	1	12	370	383	393
Minnesota	6		16	105	121	127
Missouri	5		11	165	176	181
Montana	20	2	11	1,479	1,492	1,512
Nevada	19	1	14	1,025	1,040	1,059
New Hampshire				11	11	11
New Jersey	2		13	68	81	83
New Mexico	8	1	12	481	494	502
New York	3	1	6	128	135	138
North Carolina				28	28	28
Oklahoma	1	1	15	256	272	273
Oregon	1		5	180	185	186
Pennsylvania				37	37	37
South Carolina				17	17	17
South Dakota	4			235	235	239
Tennessee	4		3	87	90	94
Texas			1	162	163	163
Utah	10		16	987	1,003	1,013
Vermont	3			15	15	18
Virginia			8	79	87	87
Washington	2	1	1	149	151	153
Wisconsin	1			46	46	47
Wyoming	1		1	26	27	28
Other States <sup>4</sup>				5	6	6
Total, 1939	173	16	304	13,390	13,710	13,883
Total, 1938	156	8	367	12,347	12,722	12,878

<sup>1</sup> 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.

<sup>2</sup> 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 a permanent partial disability.

<sup>3</sup> Disability for more than the remainder of day of accident.

<sup>4</sup> Includes Connecticut, Maryland, Massachusetts, Nebraska, Ohio, and West Virginia.

TABLE 9.—All mines: Accidents, by causes and severity of injury, during the year ended Dec. 31, 1939

Cause of accident	Killed	Nonfatal				Grand total
		Perma- nent total <sup>1</sup>	Perma- nent partial <sup>2</sup>	Tempo- rary <sup>3</sup>	Total nonfatal	
<b>Underground:</b>						
1. Fall of rock or ore from roof or wall	51	2	59	2, 180	2, 241	2, 292
2. Rock or ore while loading at work- ing face	1		16	806	822	823
3. Hand tools			21	835	856	856
4. Explosives	16	6	16	72	94	110
5. Haulage	13	3	22	1, 231	1, 256	1, 269
6. Falling down chute, winze, raise, or slope	24		16	416	432	456
7. Run of ore from chute or pocket	4	1	5	443	449	453
8. Drilling	4		20	1, 106	1, 126	1, 130
9. Electricity	1		1	29	30	31
10. Machinery	4		11	408	419	423
11. Mine fires				1	1	1
12. Suffocation from natural gases	2	1		21	22	24
13. Inrush of water						
14. Stepping on nail				328	328	328
15. Handling materials (other than rock or ore)			16	1, 220	1, 236	1, 236
16. Other causes	10		23	1, 612	1, 635	1, 645
Total, underground	130	13	226	10, 708	10, 947	11, 077
<b>Shaft:</b>						
17. Falling down shaft	10			20	20	30
18. Objects falling down shaft	1		5	42	47	48
19. Breaking of cables	2			1	1	3
20. Overwinding	2			1	2	4
21. Skip, cage, or bucket	2	1	5	59	65	67
22. Other causes			3	99	102	102
Total, shaft	17	1	14	222	237	254
<b>Open-cut:</b>						
1. Falls or slides of rock or ore	8		2	75	77	85
2. Explosives			1	6	7	7
3. Haulage	1		4	60	64	65
4. Power shovels			6	30	36	36
5. Falls of persons	3		1	89	90	93
6. Falls of derricks, booms, etc.			1	1	2	2
7. Run or fall of ore in or from ore bins				2	2	2
8. Machinery	1		2	66	68	69
9. Electricity	1			3	3	4
10. Hand tools			4	68	72	72
11. Handling material	1			128	128	129
12. Other causes	1		1	141	142	143
Total, open-cut	16		22	669	691	707
<b>Surface:</b>						
1. Mine cars, mine locomotives, or aerial trams	2	1	2	92	95	97
2. Railway cars and locomotives			1	14	15	15
3. Run or fall of ore in or from ore bins			1	32	33	33
4. Falls of persons		1	3	287	291	291
5. Stepping on nail				48	48	48
6. Hand tools			1	222	223	223
7. Electricity	1		1	32	33	34
8. Machinery	1		18	223	241	242
9. Handling materials			7	400	407	407
10. Other causes	6		8	441	449	455
Total, surface	10	2	42	1, 791	1, 835	1, 845
Grand total, 1939	173	16	304	13, 390	13, 710	13, 883
Grand total, 1938	156	8	367	12, 347	12, 722	12, 878

<sup>1</sup> 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.

<sup>2</sup> 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.

<sup>3</sup> Disability for more than the remainder of day of accident.

18 METAL- AND NONMETAL-MINE ACCIDENTS IN THE U. S.—1939

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, 1939

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
<b>Underground:</b>								
1. Fall of rock or ore from roof or wall	29.48	39.23	0.25	0.41	16.35	20.47	10.83	18.03
2. Rock or ore while loading at working face	.58	.77	(1)	.01	6.00	7.51	3.97	6.61
3. Hand tools					6.24	7.82	4.14	6.89
4. Explosives	9.25	12.31	.08	.13	.68	.86	.45	.76
5. Haulage	7.51	10.00	.06	.10	9.16	11.47	6.07	10.10
6. Falling down chute, winze, raise, or stope	13.87	18.46	.12	.19	3.15	3.95	2.09	3.48
7. Run of ore from chute or pocket	2.31	3.08	.02	.03	3.27	4.10	2.17	3.61
8. Drilling	2.31	3.08	.02	.03	8.21	10.29	5.44	9.06
9. Electricity	.58	.77	(1)	.01	.22	.27	.15	.24
10. Machinery	2.31	3.08	.02	.03	3.06	3.83	2.03	3.37
11. Mine fires					.01	.01	(3)	.01
12. Suffocation from natural gases	1.16	1.54	.01	.02	.16	.20	.11	.17
13. Inrush of water								
14. Stepping on nail					2.39	3.00	1.59	2.64
15. Handling materials (other than rock or ore)					9.02	11.29	5.98	9.94
16. Other causes	5.78	7.69	.05	.08	11.93	14.93	7.90	13.15
Total, underground	75.14	100.00	.63	1.04	79.85	100.00	52.92	88.06
<b>Shaft:</b>								
17. Falling down shaft	5.78	58.82	.05	.08	.15	8.44	.10	.16
18. Objects falling down shaft	.58	5.88	(1)	.01	.34	19.83	.23	.38
19. Breaking of cables	1.16	11.77	.01	.02	.01	.42	(1)	.01
20. Overwinding	1.16	11.77	.01	.02	.01	.84	.01	.02
21. Skip, cage, or bucket	1.16	11.77	.01	.02	.02	27.43	.32	.52
22. Other causes					.47	43.04	.49	.82
Total, shaft	9.83	100.00	.08	.14	1.73	100.00	1.15	1.91
<b>Open-cut:</b>								
1. Falls or slides of rock or ore	4.62	50.00	.04	.31	.56	11.14	.37	3.04
2. Explosives					.05	1.01	.03	.28
3. Haulage	.58	6.25	(1)	.04	.47	9.26	.31	2.53
4. Power shovels					.26	5.21	.17	1.42
5. Falls of persons	1.73	18.75	.01	.12	.66	13.03	.44	3.56
6. Falls of derricks, booms, etc					.01	.29	.01	.08
7. Run or fall of ore in or from ore bins					.01	.29	.01	.08
8. Machinery	.58	6.25	(1)	.04	.50	9.84	.33	2.69
9. Electricity	.58	6.25	(1)	.04	.02	.44	.01	.12
10. Hand tools					.53	10.42	.35	2.85
11. Handling materials	.58	6.25	(1)	.04	.93	18.52	.62	5.06
12. Other causes	.58	6.25	(1)	.04	1.04	20.55	.69	5.62
Total, open-cut	9.25	100.00	.08	.63	5.04	100.00	3.34	27.33
<b>Surface:</b>								
1. Mine cars, mine locomotives, or aerial trams	1.15	20.00	.01	.03	.69	5.18	.46	1.66
2. Railway cars and locomotives					.11	.82	.07	.26
3. Run or fall of ore in or from ore bins					.24	1.80	.16	.58
4. Falls of persons					2.12	15.86	1.41	5.08
5. Stepping on nail					.35	2.61	.23	.84
6. Hand tools					1.63	12.15	1.08	3.89
7. Electricity	.58	10.00	(1)	.02	.24	1.80	.16	.58
8. Machinery	.58	10.00	(1)	.02	1.76	13.13	1.16	4.21
9. Handling materials					2.97	22.18	1.97	7.11
10. Other causes	3.47	60.00	.03	.10	3.27	24.47	2.17	7.84
Total, surface	5.78	100.00	.05	.17	13.38	100.00	8.87	32.05
Grand total, 1939	100.00		.84		100.00		66.28	
Grand total, 1938	100.00		.83		100.00		67.61	

<sup>1</sup> Less than 0.01 percent



## CLASSIFICATION OF ACCIDENTS, BY KIND OF MINE

*Copper mines.*—A marked increase in employment was reported for the copper-mining industry in 1939, as indicated by a larger number of employees and particularly by a gain in the number of man-hours of work performed during the year. Accidents also increased in number, although the accident rate per million man-hours of exposure did not differ appreciably from that in 1938. Reports for 1939 showed an increase in the fatality rate per million man-hours, but the nonfatal-injury rate actually declined because of the relatively large increase in the number of man-hours worked.

Figures for copper mines are given in tables 2, 11, and 12. The mines covered by the figures are those whose operations were conducted chiefly for the copper content of their ores. Mines producing some copper as a byproduct are covered by the figures contained under the heading Gold, Silver, and Miscellaneous Metal Mining.

As shown in tables 11 and 12, the copper mines of the United States employed 18,436 men for an average of 285 workdays per man. The total number of man-hours worked at all copper mines was more than 42 million, a gain of more than 21 percent over 1938. Eight hours per day was the standard work shift. Accidents killed 38 employees and injured 2,481, resulting in a fatality rate of 0.90 and an injury rate of 58.93 per million man-hours of employment or exposure.

The principal cause of fatal accidents was falling rock or ore from the roof or wall. Nonfatal injuries were caused chiefly by falls of rock or ore from the roof or wall, haulage equipment, hand tools, handling material, and drilling. The slight reduction in the injury rate in 1939 was due largely to a reduction in the rates for haulage, persons falling down underground mine openings, and handling materials. The principal copper-mining States (those having the largest number of employees) were Arizona and Montana. Montana used chiefly underground mining methods and Arizona both underground and open-pit methods of mining. Other important copper-producing States were Michigan, Nevada, and Utah.

TABLE 11.—Copper mines: Men employed and man-days of employment, by States, during the year ended Dec. 31, 1939

State	Num-ber of oper-ators	Num-ber of mines	Men employed				Man-days of employment				Average hours of employment per man per day				Average days active			
			Under-ground	Open-cut	Sur-face	Total	Under-ground	Open-cut	Sur-face	Total	Under-ground	Open-cut	Sur-face	Total	Under-ground	Open-cut	Sur-face	Total
Arizona.....	22	25	3,116	1,134	1,450	5,700	353,449	425,992	1,729,728	8.00	8.00	8.00	8.00	305	312	294	303	
California.....	3	3	302	2	36	340	89,740	10,852	1,00,672	8.00	8.00	8.00	8.00	297	40	301	296	
Idaho.....	13	14	45	11	56	111	9,527	2,439	11,966	7.62	7.49	7.59	7.59	212	222	214	214	
Michigan.....	5	5	1,507	968	801	2,308	454,580	240,931	695,511	8.13	8.00	8.00	8.09	302	301	301	301	
Montana.....	4	4	4,485	508	653	1,896	1,028,381	262,372	1,290,753	8.00	8.00	8.00	8.00	229	271	237	237	
Nevada.....	5	5	755	10	354	1,281	252,212	206,586	459,113	8.00	8.00	8.00	8.00	334	257	326	311	
Utah.....	4	5	10	927	128	1,221	51,378	129,109	468,208	7.71	8.00	8.00	8.00	266	365	363	363	
Washington.....	7	7	183	597	104	1,071	99,466	25,693	82,739	8.00	8.00	8.00	8.00	269	270	245	258	
Other States <sup>1</sup> .....	6	7	370	597	104	1,071	99,466	25,693	286,634	8.00	8.00	8.00	8.00	269	270	247	268	
Total, 1939.....	69	93	10,783	3,168	4,485	18,436	2,936,678	1,335,335	5,255,324	8.02	8.00	8.00	8.01	272	310	298	285	
Total, 1938.....	60	96	10,743	2,667	4,172	17,582	2,393,774	1,173,786	4,329,288	8.00	8.00	8.00	8.00	223	286	281	246	

<sup>1</sup> Includes Colorado, New Mexico, North Carolina, Tennessee, and Wyoming.

TABLE 12.—Copper mines: Number of man-hours of employment and number killed and injured, by States, during the year ended Dec. 31, 1939

State	Man-hours of employment			Average hours per man per year			Number killed			Number injured			Wid-ows	Or-phanas
	Under-ground	Open-cut	Surface	Total	Under-ground	Open-cut	Sur-face	Total	Under-ground	Open-cut	Sur-face	Total		
Arizona.....	7,602,301	2,827,589	3,407,936	13,837,826	2,440	2,493	2,350	2,428	8	8	29	573	5	7
California.....	7,717,920	640	86,816	8,005,376	2,377	320	2,412	2,369	1	1	6	90	1	2
Idaho.....	72,504	-----	18,257	90,851	1,613	-----	1,660	1,622	-----	-----	-----	1	-----	-----
Michigan.....	3,697,293	-----	1,927,443	5,624,736	2,453	-----	2,406	2,437	-----	-----	-----	169	5	-----
Montana.....	8,227,048	-----	2,068,976	10,296,024	1,834	-----	2,168	1,804	6	6	61	945	-----	8
Nevada.....	2,017,692	1,042,520	1,652,490	4,712,702	2,672	2,052	2,611	2,486	12	4	70	380	(1)	3
Utah.....	8,536	2,708,939	1,032,875	3,745,350	2,854	2,917	2,918	2,901	4	1	38	49	1	3
Washington.....	411,024	-----	1,250,888	3,661,912	2,130	2,164	1,960	2,062	-----	-----	-----	32	-----	-----
Other States <sup>1</sup> .....	795,733	1,291,800	205,552	2,293,085	2,151	2,164	1,976	2,141	3	2	8	212	3	2
Total, 1939.....	23,550,141	7,866,488	10,681,233	42,097,862	2,184	2,483	2,382	2,283	34	3	198	2,481	(1)	(1)
Total, 1938.....	19,146,972	6,063,829	9,389,141	34,629,942	1,782	2,285	2,251	1,970	20	2	224	2,098	(1)	(1)

<sup>1</sup> Not available.

<sup>2</sup> Includes Colorado, New Mexico, North Carolina, Tennessee, and Wyoming.

*Gold, silver, and miscellaneous metal mines.*—This group covers mines producing gold and silver as their principal metals; mines producing lead or zinc elsewhere than in the Mississippi Valley States; mines producing such minor metals as tungsten, quicksilver, manganese, and several other metals; and mines producing copper as a minor product in connection with the main production of some other metal.

The mines in this classification showed gains both in number of workers and total number of man-hours worked in 1939 compared with 1938. Lode mines employed 38,439 men, placer mines 14,775 men, and miscellaneous metal mines 3,623 men. These figures are shown in table 2, which also gives the number of man-hours worked and the number of fatal and nonfatal accidents. In the group as a whole 87 men were killed by accidents in 1939 and 9,182 men were injured. The fatality rate per million hours was 0.88 and the injury rate 92.45. These rates did not differ greatly from those for 1938.

As indicated in tables 13 and 14, California was preeminently the leading State, having more than 14,000 men employed in and about the mines. Important also were Colorado, Idaho, Alaska, Montana, and Arizona.

The outstanding causes of fatal accidents in 1939 were falling down chutes or stopes, falls of rock or ore at the working face, and accidents caused by explosives. The principal causes of nonfatal injuries were falls of rock or ore at the working faces, handling materials, drilling, and haulage equipment. Table 21 gives the principal causes of accidents. The slight increase in the over-all accident rate in 1939 compared with 1938 was due mainly to increases in accidents caused by drilling, other machinery, stepping on nails, and hand tools.



TABLE 14.—Gold, silver (lode and placer), and miscellaneous metal mines: Number of man-hours of employment and number killed and injured, by States, during the year ended Dec. 31, 1939

State	Man-hours of employment			Average hours per man per year			Number killed			Number injured			Wid- ows	Or- phaans				
	Under- ground	Open- cut	Surface	Total	Under- ground	Open- cut	Sur- face	Total	Under- ground	Open- cut	Sur- face	Total						
															Under- ground	Open- cut	Sur- face	Total
Alaska.....	2,469,088	703,784	5,822,432	8,995,304	2,118	808	1,664	1,625	3	1	1	4	244	2	192	438	(1)	8
Arizona.....	4,741,288	64,480	1,441,206	6,246,974	1,652	1,573	1,280	1,547	4	4	4	4	768	1	63	832	3	
Arkansas.....	635,910	203,000	152,398	991,308	1,555	1,562	1,657	1,571	7	2	2	16	13	1	2	16		
California.....	14,642,823	1,035,036	10,925,891	26,603,750	2,016	1,334	1,795	1,883	16	1	2	10	1,695	52	437	2,184	5	5
Colorado.....	8,572,556	87,343	2,439,473	11,099,372	1,965	1,499	1,318	1,769	16	1	1	17	1,971	4	123	1,098	5	5
Georgia.....	29,840	10,448	50,588	90,876	1,066	746	888	918	1	2	2	4	2	2	2	4		
Idaho.....	7,528,232	322,321	2,309,970	10,160,523	1,856	1,221	1,273	1,656	9	1	1	10	1,320	29	130	1,479	4	9
Minnesota.....	70,671	151,260	80,995	302,926	1,860	813	1,884	1,135	1	5	5	7	452	3	77	532	(1)	(1)
Montana.....	4,511,713	105,506	1,804,269	6,421,488	1,586	977	1,558	1,562	4	2	1	7	568	18	60	646	8	20
Nevada.....	4,844,965	338,886	1,243,837	6,427,688	1,774	1,747	1,413	1,689	14	1	1	15	260	1	27	288	3	9
New Mexico.....	2,038,396	19,744	492,968	2,551,108	1,491	1,039	1,208	1,422	5	1	1	5	130	6	49	185	1	
Oregon.....	858,987	224,548	987,244	2,070,779	1,797	689	1,433	1,387	1	1	1	1	196	12	37	233	3	9
South Carolina.....	44,265	363,120	28,503	435,888	2,012	3,560	2,193	3,182	4	4	4	4	61	7	68	83		
Texas.....	3,250,347	1,200	1,716,839	4,968,386	2,479	240	2,256	2,392	4	2	2	7	88	3	7	913	4	4
Utah.....	693,057	630	139,626	833,313	2,390	630	2,407	2,388	5	2	2	7	788	3	1	47	1	2
Virginia.....	6,108,223	132,504	1,074,732	7,315,459	1,966	2,137	1,919	1,962	5	2	2	2	89	8	9	106	1	2
Washington.....	606,387	116,061	75,238	797,686	1,883	1,984	1,929	1,895	2	1	1	2	618					
West Virginia.....	876,392	119,424	302,375	1,298,191	1,712	1,659	1,260	1,575	2	2	2	2	745					
Wyoming.....	21,686	10,784	24,120	56,590	748	1,348	618	745										
Alabama, Missouri, and North Carolina.....	41,731	43,056	7,840	92,627	745	1,305	1,120	965										
Maryland, Massachusetts, New Jersey, New York, Tennessee, and West Virginia.....	1,309,087	53,293	190,928	1,553,308	1,919	1,567	1,872	1,899	1			1	75	12				
Total, 1939.....	63,895,644	4,106,428	31,311,472	99,313,544	1,882	1,219	1,604	1,747	74	7	6	87	7,684	160	1,338	9,182	(1)	(1)
Total, 1938.....	63,284,426	3,920,671	29,396,774	96,601,871	2,000	1,209	1,772	1,877	87	2	2	91	7,505	169	1,160	8,884	(1)	(1)

1 Not available.

*Iron mines.*—For a number of years the iron-mining industry has excelled other branches of metal mining in maintaining favorable accident rates among its employees. Rates for 1939 again show the position of iron mining to be a favorable one. The fatality rate recorded by the mining companies was 0.64 per million man-hours of exposure and the nonfatal-injury rate 16.87. The combined rate of 17.51 was not quite as low as that for 1938. The rates for 1939 represent 23 deaths and 602 nonfatal injuries among 19,769 employees. The mines were active for an average of 225 days per man, during which time the total volume of labor performed was more than 35 million man-hours. Falls of rock or ore from the roof or wall caused 11 fatalities, or nearly half the total number due to all causes, and were the principal cause of nonfatal injuries underground. Haulage accidents ranked second as a cause of fatal and nonfatal injuries in underground mines and accidents due to handling materials third. In open-pit mining of iron ore 3 fatal accidents and 82 nonfatal accidents were reported in 1939. Table 21 shows the frequency, severity, and causes of the accidents reported by mining companies to the Bureau of Mines.

The leading States in the mining of iron ore by underground mining methods in 1939 were Michigan, Alabama, and Minnesota. The leading State in open-cut methods of mining was Minnesota with no near competitor.

TABLE 15.—Iron mines: Men employed and man-days of employment, by States, during the year ended Dec. 31, 1939

State	Num-ber of oper-ators	Men employed				Man-days of employment				Average hours of employ-ment per man per day				Average days active			
		Under-ground	Open-cut	Sur-face	Total	Under-ground	Open-cut	Sur-face	Total	Under-ground	Open-cut	Sur-face	Total	Under-ground	Open-cut	Sur-face	Total
Alabama	1 44	3 508	4 557	4 553	801 572	114 983	124 673	1 041 228	8 00	8 55	8 00	8 06	228	196	273	229	
Michigan	22 44	4 227	1 749	6 243	932 464	34 665	385 229	1 352 358	8 03	8 00	8 01	8 02	221	130	220	217	
Minnesota	28 65	2 085	3 043	6 270	463 731	615 575	280 312	1 359 618	8 00	8 00	7 97	7 99	222	202	245	217	
New York	4 6	457	3	148	608	119 534	45 501	1 655 305	8 00	8 00	8 00	8 00	262	90	307	272	
New Jersey and Pennsylvania	5 8	570	199	186	955	162 058	51 386	281 991	8 04	8 00	7 86	8 00	284	344	276	265	
Georgia, Virginia, and Tennessee	18 19	3	98	101	14 527	14 527	14 542	8 20	8 20	8 20	8 20	5	148	144	144	144	
California, South Dakota, Utah, Washington, and Wyoming	13 13	113	68	60	24 827	11 652	13 242	49 721	8 00	7 96	8 00	7 99	220	171	221	206	
Missouri and Wisconsin	1 8	474	157	167	116 355	27 593	42 016	185 964	8 00	8 00	8 00	8 00	245	176	252	233	
Total, 1939	1 142	11 437	4 423	3 909	19 769	2 620 556	887 812	942 359	4 450 727	8 01	8 07	7 99	8 02	229	201	241	225
Total, 1938	1 112	10 729	3 311	3 966	18 006	2 071 746	605 452	878 481	3 555 679	8 00	8 13	7 99	8 02	193	183	222	197

<sup>1</sup> Excludes an undetermined number of small pits in Alabama and Missouri.

TABLE 16.—Iron mines: Number of man-hours of employment and number killed and injured, by States, during the year ended Dec. 31, 1939

State	Man-hours of employment				Average hours per man per year				Number killed				Number injured				Wid-ows
	Under-ground	Open-cut	Sur-face	Total	Under-ground	Open-cut	Sur-face	Total	Under-ground	Open-cut	Sur-face	Total	Under-ground	Open-cut	Sur-face	Total	
Alabama	6 412 567	982 715	997 382	8 302 664	1 828	1 671	2 182	1 843	9	1	10	135	10	2	147	4	
Michigan	7 487 341	277 329	3 084 683	10 849 353	1 771	1 089	1 764	1 738	3	3	3	144	5	14	163	3	
Minnesota	3 709 857	4 924 876	2 235 353	10 870 086	1 779	1 618	1 957	1 734	3	3	6	39	49	6	114	3	
New York	956 278	2 160	364 009	1 322 447	2 093	720	2 480	2 175	2	2	2	47	47	5	82	1	
New Jersey and Pennsylvania	1 303 190	545 374	403 891	2 255 455	2 286	2 756	2 171	2 362	2	2	2	33	10	2	65	1	
Georgia, Virginia, and Tennessee	120	119 072	119 192	119 192	40	1 215	1 180	1 180	1	1	1	1	1	1	1	1	0
California, South Dakota, Utah, Washington, and Wyoming	198 616	920 787	105 932	387 335	1 758	1 365	1 766	1 649	1	1	1	20	3	4	27	1	0
Missouri and Wisconsin	930 838	220 740	336 132	1 487 710	1 964	1 406	2 013	1 864	1	1	1	29	4	33	33	2	
Total, 1939	20 998 307	7 168 053	7 527 382	35 694 242	1 836	1 621	1 926	1 806	19	3	1	23	487	82	602	13	9
Total, 1938	16 575 015	4 921 185	7 019 230	28 515 430	1 545	1 486	1 770	1 584	16	3	1	20	388	42	456	14	10



*Lead and zinc mines (Mississippi Valley States).*—Although lead and zinc was produced in various parts of the United States, mines producing these metals in the Mississippi Valley States form a natural class from the standpoint of mine safety and are presented as a single group in this bulletin. Mines producing these metals in other States are covered under the heading Gold, Silver, and Miscellaneous Metal Mines. The figures for lead-zinc mines in the Mississippi Valley include those for fluorspar mines as well as lead and zinc mines in Illinois and Kentucky. The publication of data for Illinois and Kentucky makes possible the inclusion of a chain of accident rates that began in 1911, the first year for which accident statistics for metal mines were compiled by the Bureau of Mines.

The lead and zinc mines of the Mississippi Valley employed 7,237 men in 1939 for an average of 216 days per man, the combined volume of labor for all employees being more than 12 million man-hours. Fifteen men were killed and 726 men injured by mine accidents during the year; the fatality rate was 1.20 and the injury rate 58.32 per million man-hours worked. On January 31, 1939, five men were killed in a zinc mine in Kansas in an accident caused by a fall of roof. The combined accident rate for the group in 1939 was slightly in excess of that for 1938. The principal cause of the increase was a rise in the number of accidents due to falls of rock from roof or wall, haulage equipment, drilling, and handling materials.

Oklahoma and Missouri were the leading States in 1939, having the largest number of employees, with Kansas ranking third.

TABLE 17.—Lead and zinc mines <sup>1</sup> (Mississippi Valley): Men employed and man-days of employment, by States, during the year ended Dec. 31, 1939

State	Num-ber of opera-tors	Num-ber of mines	Men employed			Man-days of employment			Average hours of employ-ment per man per day			Average days active		
			Under-ground	Open-cut	Sur-face	Under-ground	Open-cut	Total	Under-ground	Sur-face	Total	Under-ground	Open-cut	Total
Illinois.....	20	26	267	36	303	49,802	6,851	56,653	7.80	8.00	7.82	187	190	187
Kansas.....	18	28	1,205	77	1,282	267,510	13,790	281,300	7.96	7.86	7.96	222	179	219
Kentucky.....	37	47	453	133	586	92,486	30,579	123,065	8.02	8.19	8.06	204	230	210
Missouri.....	31	35	1,993	45	2,120	420,618	12,803	446,921	7.97	8.00	7.97	211	300	211
Oklahoma.....	36	4	2,177	136	2,313	441,875	34,748	476,623	7.96	7.97	7.96	203	236	203
Tennessee.....	4	4	437	91	528	122,319	27,168	149,487	8.00	8.00	8.00	280	239	280
Wisconsin.....	4	5	84	21	105	24,887	6,100	30,987	7.18	7.20	7.18	286	290	285
Total, 1939.....	150	204	6,616	45	7,237	1,419,497	13,500	1,522,039	7.95	8.00	7.95	215	300	229
Total, 1938.....	146	194	5,994	391	6,436	1,228,809	10,495	1,330,395	7.96	8.20	7.96	205	206	233

<sup>1</sup> Includes flourspar mines in Illinois and Kentucky.

TABLE 18.—Lead and zinc mines <sup>1</sup> (Mississippi Valley): Number of man-hours of employment and number killed and injured, by States, during the year ended Dec. 31, 1939

State	Man-hours of employment			Average hours per man per year			Number killed			Number injured			Wid-ows	Or-phans
	Under-ground	Open-cut	Total	Under-ground	Open-cut	Total	Under-ground	Open-cut	Total	Under-ground	Open-cut	Total		
Illinois.....	388,409	54,803	443,212	1,455	1,522	1,463	6	6	13	13	2	15	5	4
Kansas.....	2,129,949	108,432	2,238,381	1,768	1,408	1,746	2	2	178	58	4	188	5	4
Kentucky.....	3,742,099	230,383	3,972,482	1,638	1,883	1,694	6	6	133	11	4	162	3	3
Missouri.....	3,352,145	102,087	3,454,232	1,682	2,400	1,977	5	5	242	21	21	263	1	2
Oklahoma.....	3,516,462	277,074	3,793,536	1,615	2,037	1,640	1	1	19	19	1	19	1	2
Tennessee.....	978,946	217,840	1,196,786	2,237	2,388	2,265	1	1	17	17	1	17	1	2
Wisconsin.....	178,681	43,899	222,580	2,129	2,090	2,120	15	15	660	578	11	726	10	9
Total, 1939.....	11,286,291	108,000	12,448,309	1,706	2,400	1,720	15	15	578	3	55	608	13	23
Total, 1938.....	9,783,716	86,102	10,595,478	1,632	1,688	1,646	15	15	578	3	27	608	13	23

<sup>1</sup> Includes flourspar mines in Illinois and Kentucky.

<sup>2</sup> Major disaster, Jan. 31, 1939, in which 5 men were killed.

*Nonmetallic mineral mines.*—This group includes all mines producing rock salt, gypsum, phosphate rock, and other nonmetallic minerals except coal and stone. Mines in the group employed 9,630 men in 1939, a small increase over 1938. Each employee averaged 228 work-days during the year, and the total working time for all employees at all mines was more than 17 million man-hours. Accidents resulted in the death of 10 employees and 719 nonfatal injuries. These figures represent a fatality rate of 0.58 and an injury rate of 41.61 per million man-hours of exposure to hazard. These rates were slightly higher than the corresponding rates for 1938.

The 10 fatalities were due to various causes, none of which was outstanding. The causes of the largest number of accidents were loading material and falls of rock at the working face. In open-pit mining the outstanding causes of nonfatal injuries were handling materials and falls of persons. Increases in the accident rates were reported for falls of rock at the working face, accidents while loading, haulage, persons falling down underground mine openings, and handling materials.

New York was the leading State in the mining of nonmetallic minerals by underground mining methods, followed by California and New Mexico. In open-pit mining the more important States were Florida, Tennessee, Missouri, and North Carolina.



TABLE 20.—Nonmetallic-mineral mines: Number of man-hours of employment and number killed and injured, by States, during the year ended Dec. 31, 1939

State	Man-hours of employment				Average hours per man per year				Number killed				Number injured				Wid-ows	Or-phans
	Under-ground	Open-cut	Surface	Total	Under-ground	Open-cut	Sur-face	Total	Under-ground	Open-cut	Sur-face	Total	Under-ground	Open-cut	Sur-face	Total		
California	517,183	351,733	135,439	1,004,355	1,815	1,401	1,035	1,657	26	9	9	44						
Colorado	57,840	74,102	8,128	140,070	1,194	1,071	1,161	1,103	7	10	2	19						
Florida	1,959,316	1,000,081	830,743	3,800,051	1,871	1,871	2,257	2,108	1	28	20	48				5		
Georgia	49,291	292,349	900,960	1,300,591	1,641	1,004	2,580	2,006		4	3	6						
Illinois	19,000	203,712	17,136	239,848	2,400	2,230	2,448	2,291		9	3	26						
Iowa	177,558	27,288	17,004	211,850	1,583	1,819	1,572	1,611	23	3	3	40						
Kansas	288,088	29,008	67,157	384,253	1,583	1,985	2,638	1,513	38	2	14	34						
Louisiana	239,411	52,814	845,543	1,104,954	1,894	920	2,781	2,606	20	20	14	34						
Maine	309,889	119,194	99,555	528,641	1,940	2,091	2,118	2,015	1	4	2	10				1		
Michigan	38,922	337,416	7,529	376,408	1,560	1,035	1,883	1,845	1	1	15	15						
Missouri	134,557	85,579	7,020	127,088	2,065	1,452	2,465	1,442	1	13	14	14						
Montana	30,480	137,945	59,445	102,413	1,325	1,231	1,193	1,400		1	10	13						
Nevada	514,205	4,160	84,238	862,503	2,057	1,462	2,588	2,400		3	1	3						
New Hampshire	1,041,297	53,605	201,777	1,306,722	1,995	1,675	2,917	1,853	2	44	5	54				4		
New Mexico	1,197,736	313,577	61,048	1,572,361	1,991	1,012	1,969	1,286		10	3	22						
New York	8,127	139,897	132,990	261,014	1,292	1,197	1,446	1,446		9	9	9						
Ohio	7,060	130,650	612,400	1,337,016	1,435	1,156	1,188	1,188		2	2	9						
Oklahoma	118,461	371,956	2,646,303	3,076,017	1,390	1,733	2,035	2,432	1	28	25	53						
Texas	146,295	163,516	70,868	280,680	1,601	1,038	1,436	2,223	1	13	71	95						
Utah	54,417	110,655	59,566	214,638	1,741	1,323	2,025	1,684	1	4	4	8						
Vermont	189,852	240,152	500,360	1,030,364	1,614	1,687	2,018	1,809	2	2	10	15				7		
Virginia	17,660	189,802	15,992	213,454	1,104	1,774	1,989	1,706		1	10	12						
Washington	12,080	451,253	18,048	481,381	134	1,275	1,128	1,046		2	31	8						
Alabama, Arkansas, Kentucky, and South Carolina																		
Connecticut, Maryland, Massachusetts, Ohio, and Pennsylvania																		
Arizona, Idaho, Nebraska, Oregon, and Wyoming																		
Total, 1939	4,576,948	6,030,125	6,674,093	17,281,166	1,737	1,470	2,287	1,795	5	3	2	10				7		
Total, 1938	4,867,179	6,372,130	6,568,136	17,827,445	1,820	1,601	2,297	1,871	1	4	1	6				3		



Gold; Placer	2	16	21	16	22	16	5	20	1	11	2	1	2	1	16	23	226	8	4	5	3	14
Miscellaneous	1																					
Nonmetal																						
Total	59	16	21	16	22	16	5	20	1	11	2	1	2	1	16	23	226	8	4	5	3	14
Temporary:																						
Copper	546	78	200	14	206	66	83	183	2	66	2	2	2	2	40	185	310	1,891	8	11	14	47
Iron	116	31	24	11	46	17	10	31	3	31	3	3	3	3	5	46	54	445	1	1	14	14
Lead and zinc (Mississippi Valley)	128	17	2	4	17	17	8	58	3	30	3	3	3	3	12	43	66	615	6	6	3	12
Gold; silver, miscellaneous	1,347	517	566	28	807	304	320	836	19	295	1	19	269	908	1,144	1,144	7,308	11	24	1	39	79
Gold; silver, Lode	1,278	484	510	33	769	277	320	795	19	277	1	19	254	860	1,058	6,954	9	23	1	1	37	76
Gold; Placer	44	2	5	4	4	27	0	1	1	18				3	4	34	1					
Miscellaneous	14	31	51	2	34	4	40	18	2	6				15	45	83	410	1	1	2	3	7
Nonmetal	43	63	24	7	30	11	3	12	2	6				2	28	38	289					5
Total	2,180	806	835	72	1,231	416	443	1,106	29	408	1	21	328	1,220	1,612	10,708	20	42	1	1	59	99
Total nonfatal:																						
Copper	560	81	207	16	209	69	87	184	2	67	2	2	40	187	315	2,026	8	12			14	48
Iron	190	36	30	17	133	18	19	21	3	31	3	3	5	60	66	434	1	7			5	17
Lead and zinc (Mississippi Valley)	122	118	23	6	133	18	18	16	4	12			12	97	1,157	7,528	11	27			2	43
Gold; silver, miscellaneous	1,385	524	572	47	816	316	332	843	19	302	1	20	269	917	1,157	7,528	11	27			2	43
Gold; silver, Lode	1,314	491	516	42	778	289	322	800	19	282	1	20	254	869	1,071	7,128	9	26			2	41
Gold; Placer	14	2	5	1	4	27	1	1	1	25			15	43	3	34	1	1			2	3
Miscellaneous	57	31	51	4	34	11	3	13	2	7			15	28	39	274					2	3
Nonmetal	44	63	24	8	30	11	3	13	2	7			15	28	39	274					2	3
Total	2,241	822	856	94	1,256	432	449	1,126	30	419	1	22	328	1,236	1,635	10,947	20	47	1	2	65	102
Total fatal and nonfatal:																						
Copper	577	82	207	17	213	71	89	186	3	67	3	3	40	187	317	2,058	10	12			14	50
Iron	131	36	30	18	71	21	19	21	3	31	3	3	5	60	57	503	1	7			5	17
Lead and zinc (Mississippi Valley)	118	23	9	3	135	19	8	65	4	13			12	44	68	698	1	7			5	17
Gold; silver, miscellaneous	1,368	524	572	38	820	334	334	845	19	304	1	22	269	917	1,163	7,580	18	28			4	45
Gold; silver, Lode	1,326	491	516	53	782	305	322	802	19	284	1	22	254	869	1,077	7,123	16	27			4	45
Gold; Placer	14	2	5	1	4	29	1	1	1	20			15	45	3	34	1	1			2	7
Miscellaneous	58	31	51	4	34	11	3	13	2	8			15	45	83	423	1	1			2	3
Nonmetal	46	63	24	8	30	11	3	13	2	8			15	28	40	278					2	3
Total, 1939	2,292	823	856	110	1,269	456	453	1,130	31	423	1	24	328	1,236	1,645	11,077	30	48	3	4	67	102
Total, 1938	2,137	918	766	63	1,244	479	452	1,009	30	278	11	47	1,225	1,190	1,470	10,320	26	51	4	3	91	81







## REVIEW BY STATES

As shown in table 2 and other tables in this bulletin, the accident-frequency rate for the metal- and nonmetal-mining industry of the United States in 1939, although not greatly reduced, was slightly more favorable than the corresponding rate in 1938. Mines in various States contributed to the slight reduction in the accident rate for the country as a whole. Table 22 presents the salient features of the accident situation in each of the principal mining States in 1939 and shows the number of nonfatal injuries per million man-hours of exposure to mining hazards.

By far the majority of mine accidents result in nonfatal injuries. As stated elsewhere, less than 2 percent of the total number of accidents resulted in the death of the injured employees. Because most accidents are nonfatal, the accident rates in table 22 relate to nonfatal injuries only. The rates are computed for underground mines, based upon the number of man-hours worked underground, and open-pit mines, based upon the number of man-hours worked inside the pits.

The underground accident rate for metal and nonmetal mines in the United States in 1939, based upon nonfatal injuries only, was 89.97 per million man-hours worked underground. This rate represents an improvement compared with the corresponding rate of 91.81 for 1938. The reduction in the 1939 rate was shown by reports from mining companies to have been due chiefly to lower rates for accidents incident to loading ore at the working face and accidents caused by handling materials.

Several important States had accident rates more favorable than the rate for the United States as a whole, whereas other States had accident rates less favorable than that of the United States. The following discussion points out the accidents in individual States in 1939 compared with 1938 and compared with the United States rate for 1939. The comparison of each State's record for 1939 with that for 1938 reveals the classes of accidents for which the rates increased or decreased in 1939.

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, 1939

UNDERGROUND

Cause	Minnesota	Alabama	Michigan	Missouri	New York	South Dakota	Oklahoma	Kansas	United States	Montana	Arizona	Colorado	California	Nevada	New Mexico	Utah	Idaho
Fall of rock or ore from roof or wall	4.23	3.73	9.74	6.17	9.38	4.91	12.22	16.54	18.03	27.79	22.53	19.00	19.40	29.01	27.39	24.59	37.00
Rock or ore while loading at working face	1.53	3.11	3.31	5.58	6.83	12.28	15.06	19.44	6.61	3.57	5.40	3.82	11.52	4.79	4.85	5.59	9.63
Health	1.59	6.90	1.83	6.75	6.83	10.44	12.50	26.00	10.10	11.95	9.03	12.74	11.15	14.22	10.05	15.01	17.47
Hand tools	1.85	1.30	1.57	2.35	2.99	2.76	3.12	7.02	6.89	5.98	13.82	9.50	7.05	9.86	7.63	9.58	16.44
Drilling	3.77	1.30	2.52	4.11	5.12	4.91	7.67	1.24	9.06	8.38	10.82	14.36	15.62	8.56	16.29	7.82	12.85
Handling materials (other than rock or ore)	.79	1.86	1.57	4.11	2.12	6.45	3.12	4.14	9.94	13.97	8.80	13.90	14.74	14.65	7.63	17.40	22.99
Falling from chute, winze, raise, or slope	.55	.15	.43	2.64	3.41	.31	1.42	1.24	3.48	4.19	3.63	4.40	4.41	4.79	5.89	8.46	7.71
Run ore from chute or pocket	.27	.15	1.13	.59	2.13	1.84	1.14	1.65	3.48	5.36	3.55	3.36	6.55	1.45	11.09	3.35	3.60
Machinery	.55	1.71	1.13	1.17	2.43	1.84	3.12	1.83	3.37	4.35	3.39	6.60	3.15	6.82	3.47	5.43	5.52
Shaft	.27	.15	1.13	1.17	2.43	1.84	3.12	1.83	3.37	4.35	3.39	6.60	3.15	6.82	3.47	5.43	5.52
All other causes	3.70	1.71	5.65	5.87	9.81	14.43	7.96	9.51	16.97	17.39	22.21	23.63	17.45	20.60	30.86	31.14	32.63
All causes (underground, including shaft)	16.93	20.97	29.75	39.34	51.19	60.17	68.75	89.33	89.97	104.87	105.69	113.28	113.68	117.51	126.88	130.77	170.98

OPEN-CUT

Cause	Arizona	Alabama	Minnesota	Utah	Florida	United States	Missouri	California	Tennessee	Nevada	New Mexico
Handling materials			1.77	3.43	5.56	5.06	10.05	11.47	9.03	9.52	11.40
Hand tools			2.17	1.37	3.18	2.85		2.87	4.52	8.84	12.92
Falls of persons	1.38		2.17	1.37	3.18	3.56		5.02	4.52	7.48	8.36
Falls or slides of rock or ore	.34	0.97	.39	4.11		3.05	7.18	5.73	1.13	7.48	2.88
Machinery			.79	1.37	2.38	2.69	1.43	6.45		6.80	7.60
Haulage	.69	1.94	1.38	2.06	.79	2.53	1.43	5.73		10.89	6.84
Power shovels			1.39	1.37	1.59	1.42	8.61	5.72	4.52	1.36	5.32
All other causes	.34	5.82	2.37	1.71	8.73	6.17	5.74	5.73	22.59	16.33	16.72
All causes (open-cut)	3.44	9.70	9.85	16.79	22.23	27.33	34.44	43.72	46.31	68.70	71.44

*Alabama.*—The accident rate for nonfatal injuries underground in the mines of Alabama was not as favorable in 1939 as in 1938; the less favorable showing was due chiefly to increases in accidents chargeable to haulage and falls of rock at the working face. Nevertheless, the rate for Alabama was decidedly more favorable than that for the United States as a whole.

*Arizona.*—The frequency of nonfatal injuries in Arizona increased slightly in 1939 owing to increases in accidents chargeable to hand tools and drilling. The rate for the State was less favorable than the average for the United States.

*California.*—Although the accident rate for California in 1939 did not compare favorably with the average for the United States, the record for the State showed a marked improvement over 1938. The improvement was quite general, applying to most of the principal causes of underground accidents, as shown in table 22.

*Colorado.*—The underground mine-accident rate for Colorado, which had been more favorable in 1938 than the average rate for the United States, suffered a set-back in 1939; as a result the injury rate was considerably above that for the country as a whole. Falls of rock at the working face and haulage accidents and accidents due to hand tools, drilling, handling materials, and machinery all increased.

*Idaho.*—There was a large increase in the injury rate for mines in Idaho in 1939; the rate was the highest for any State listed in table 22 and much higher than the average for the United States. The rates were higher for most of the principal classes of accidents.

*Kansas.*—Although the injury rate for mines in Kansas was higher in 1939 than in 1938, it was still a fraction lower than the average rate for the United States. Increased rates were reported for accidents caused by falls of rock at the working face, haulage, and drilling.

*Michigan.*—Mines in Michigan, which enjoy a more favorable safety record than those in the United States as a whole, also established a better record in 1939 than in 1938. Haulage accidents were reduced as were accidents caused by hand tools, drilling, handling materials, falling down chutes, and run of ore from chutes.

*Minnesota.*—Among the important States listed in table 22, Minnesota established the best injury record for underground mining. The State rate not only was much more favorable than that for the United States but also represented an improvement over 1938. Fewer accidents due to hand tools, handling materials, and falling down chutes accounted for the improvement in 1939.

*Missouri.*—Although the injury rate for underground mining in Missouri in 1939 was much lower than that for the United States, it was much higher than in 1938. Accidents caused by machinery were less frequent in 1939, but higher rates were reported for many other classes of accidents, especially falls of rock at the working face, accidents while loading ore, hand tools, and drilling.

*Montana.*—A slight reduction in the injury rate was reported for underground mines in Montana in 1939 compared with 1938. The rates were lower for accidents caused by falls of rock at the working face, loading, hand tools, and handling materials.

*Nevada.*—The injury rate for underground mining in Nevada increased slightly in 1939 and was higher than the average rate for the United States both in 1939 and 1938. Although several classes of accidents declined in frequency in 1939, a net increase in rate was

shown for accidents caused by hand tools, handling materials, falling down chutes, machinery, and haulage.

*New Mexico.*—The injury rate for underground mines in New Mexico was higher in 1939 than in 1938 and was also higher than the average United States rate. The higher rate was due to an increase in accidents caused by falls of rock, drilling, and run of ore from chutes. A notable improvement was indicated in the rate for accidents while the employees were loading ore at the working face.

*New York.*—The accident rate for underground mining in New York in 1939 compared favorably with the known record for the State in 1938 and also with the record for the United States in 1939. Although haulage accidents increased in frequency, declines were reported for accidents caused by drilling, handling materials, falling down chutes, and machinery.

*Oklahoma.*—A marked improvement was indicated in the injury rate for underground mines in Oklahoma in 1939. The rate was much lower than that for 1938 and was more favorable than the rate for the United States in both years. Reductions in frequency were reported for accidents caused by loading ore, haulage, drilling, handling materials, and several other causes, as shown in table 22.

*South Dakota.*—The injury rate for underground mines in South Dakota compared favorably with that for the United States as a whole both in 1939 and 1938. Moreover, the rate for South Dakota was lower in 1939 than in 1938. The improvement was credited to a better record for accidents caused by falls of rock at the working face, hand tools, drilling, and machinery.

*Utah.*—The injury rate for underground mines in Utah increased in 1939 compared with 1938, and the rate for the State was higher in both years than the corresponding rate for the United States. The higher rate in 1939 was caused by increases in accidents due to falls of rock at the working face, hand tools, handling materials, falling down chutes, and machinery.

### ACCIDENTS CLASSIFIED BY MINING METHODS

The classification of mining methods employed in this series of statistical bulletins since 1929 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. Hydraulicking.
12. Dredging.

The most widely used method of mining in 1939 was open stoping, including room-and-pillar mining and sublevel stoping; this group had the largest number of mines and the largest number of employees. Ranking next in number of employees, but with only about a third as many men as in open stoping, were the square-set and the cut-and-fill

methods. Of the seven methods of underground mining shown in table 23, top slicing had the most favorable accident-frequency rate, although the rate for sublevel caving was nearly as favorable. The highest accident rate for underground mining methods was reported for square-setting. The most important method of surface mining was open-cutting with power shovels; the accident rate for mines in this group was more favorable than that for any method of mining underground.

The mining method used by mining companies is determined chiefly by the type of deposit, the character and value of the ore, and the possibility of mining the ore at an economically sound cost.

Table 23 shows the number of mines, number of employees, number of accidents, and accident rates for mines having 25 or more employees, classified according to the principal mining method employed, as shown on the company report to the Bureau of Mines.

The figures for open stoping in the table relate largely to iron-ore mines in Alabama and Michigan, lead-zinc mines in Kansas, Oklahoma, and Missouri, and gold-silver mines in Arizona, California, and Nevada. Figures for shrinkage methods are based chiefly upon reports covering gold-silver mines in the Western States. The cut-and-fill method was used mainly by gold-silver mines in Idaho and California and copper mines in Arizona. Mining by square-set methods was reported by gold-silver-copper-lead-zinc mines in the Western States. Block caving is employed by a few metal mines in Arizona, Colorado, and several other States. Data for sublevel caving apply chiefly to iron-ore mines in Michigan and Minnesota; data for top slicing to iron-ore mines in Michigan and Minnesota; and data for open-pit mining to iron-ore mines in Minnesota. The number of accidents, classified by causes, is shown for each mining method in tables 24, 25, and 26.

TABLE 23.—Metal-mine accident data, grouped by mining methods, during the year ended Dec. 31, 1939, for selected companies, with figures for 1938<sup>1</sup>

1939

Method of mining	Number of mines	Number of States	Average days active	Man-days	Men employed	Man-hours of employment	Number killed	Number injured	Rates per million man-hours	
									Killed	Injured
Open stopes, including room-and-pillar and sublevel stoping.....	136	21	246	3,963,100	16,081	31,432,845	38	2,228	1.21	70.88
Shrinkage.....	35	12	301	965,085	3,530	7,407,581	14	1,402	1.77	112.81
Cut-and-fill.....	30	9	255	1,394,930	3,357	12,507,131	10	1,401	1.51	111.92
Square-set.....	6	4	276	1,533,630	3,637	12,378,538	0	1,567	1.81	123.87
Block caving.....	15	3	324	633,620	1,954	3,798,232	0	148	1.78	113.82
Sublevel caving.....	3	3	240	594,230	2,459	4,734,238	4	144	.84	24.92
Top slicing.....	20	4	218	734,630	3,395	3,385,403	3	144	.60	24.22
Open-cut, with power shovel.....	46	12	260	1,723,964	6,042	13,832,325	6	295	.43	21.33
Open-cut, hand loading only.....	2	2	280	22,049	76	134,340	-----	4	-----	23.92
Total.....	325	-----	262	11,820,296	45,159	94,036,994	103	7,190	1.10	76.46

1938

Method of mining	Number of mines	Number of States	Average days active	Man-days	Men employed	Man-hours of employment	Number killed	Number injured	Rates per million man-hours	
									Killed	Injured
Open stopes, including room-and-pillar and sublevel stoping.....	153	22	238	3,872,585	16,279	30,731,667	42	2,698	1.37	87.79
Shrinkage.....	42	12	294	1,015,308	3,414	8,035,271	12	1,081	1.40	134.53
Cut-and-fill.....	38	10	286	1,516,341	3,493	12,081,182	10	1,300	1.57	107.61
Square-set.....	40	10	286	1,617,772	5,755	12,226,440	12	1,603	1.91	121.20
Block caving.....	3	4	303	450,241	1,478	3,671,092	0	135	2.45	95.53
Sublevel caving.....	14	4	216	454,830	1,043	3,537,713	5	103	1.41	26.14
Top slicing.....	20	2	223	546,358	2,705	3,371,674	3	80	.60	20.36
Open-cut, with power shovel.....	42	12	233	1,301,540	5,583	10,436,680	4	188	.88	18.01
Open-cut, hand loading only.....	2	2	135	14,430	98	115,440	-----	1	-----	8.66
Total.....	356	-----	252	10,805,544	42,902	86,207,168	106	7,414	1.23	86.00

<sup>1</sup> Underground and open-cut only. No reports used for mines where less than 25 men were employed.

TABLE 24.—Fatalities, classified by principal causes and mining methods, at metal mines, during the year ended Dec. 31, 1939, for selected companies<sup>1</sup>

Method of mining	By fall of rock: 1 and 12			By run or fall of ore while loading: 2, 7, and 7			Explosives: 4 and 2			By haulage: 5 and 3			By falls of per- sons: 6 and 5			Miscellaneous: 3, 8, 9, 10, 11, 12, 13, 14, 15, 16, 4, 6, 8, 9, 10, 11, and 12			In shaft: 17, 18, 19, 20, 21, and 22			Total		
	Number	Percent of total	Rate per million man-hours	Number	Percent of total	Rate per million man-hours	Number	Percent of total	Rate per million man-hours	Number	Percent of total	Rate per million man-hours	Number	Percent of total	Rate per million man-hours	Number	Percent of total	Rate per million man-hours	Number	Percent of total	Rate per million man-hours			
Open stope, including room-and-pillar and sublevel stoping	15	39.48	0.48	1	2.63	0.03	7	18.42	0.22	5	13.16	0.16	7	18.42	0.22	2	5.26	0.06	1	2.63	0.03	38	100	1.21
Shrinkage	5	35.71	.63	1	7.14	.13	2	14.29	.25	2	14.29	.25	3	21.43	.38	1	7.14	.13	14	100	1.77	14	100	1.77
Cut-and-fill	8	42.11	.63	3	15.79	.24	3	15.79	.24	1	5.26	.08	3	15.79	.24	1	5.26	.08	19	100	1.51	19	100	1.51
Square-set	1	10.00	.08	4	44.45	.79	1	11.11	.20	1	10.00	.08	3	30.00	.20	1	10.00	.08	10	100	1.81	10	100	1.81
Block caving	2	22.22	.39	4	44.45	.79	1	11.11	.20	1	10.00	.08	3	30.00	.20	2	22.22	.39	9	100	1.78	9	100	1.78
Sublevel caving	2	50.00	.42	4	44.45	.79	1	25.00	.21	1	25.00	.21	1	11.11	.20	2	22.22	.39	4	100	1.84	4	100	1.84
Top slicing	1	33.33	.17	4	44.45	.79	1	33.33	.17	1	16.67	.07	1	11.11	.20	1	25.00	.21	3	100	1.51	3	100	1.51
Open-cut, with power shovel	1	16.67	.07	4	44.45	.79	1	33.33	.17	1	16.67	.07	1	11.11	.20	1	25.00	.21	4	100	1.84	4	100	1.84
Open-cut, hand loading only	1	16.67	.07	4	44.45	.79	1	33.33	.17	1	16.67	.07	1	11.11	.20	1	25.00	.21	3	100	1.51	3	100	1.51
Total	35	33.98	0.37	6	5.82	0.06	14	13.50	0.15	10	9.71	0.11	19	18.45	0.20	11	10.68	0.12	8	7.77	0.09	103	100	1.10

<sup>1</sup> Underground and open-cut only. No reports used for mines where less than 25 men were employed.

<sup>2</sup> No. 1 underground and No. 1 open-cut. Similarly, where two identical numbers appear throughout the remainder of the table, the first refers to underground and the second to open-cut. For a complete list of causes see table 6.



TABLE 25.—*Injuries, classified by principal causes and mining methods at metal mines, during the year ended Dec. 31, 1939, for selected companies*<sup>1</sup>

Method of mining	By fall of rock: 1 and 1 <sup>2</sup>			By run or fall of ore while loading: 2, 7, and 7			Explosives: 4 and 2			By haulage: 5 and 3			By falls of persons: 6 and 5			Miscellaneous: 3, 8, 9, 10, 11, 12, 13, 14, 15, 16, 4, 6, 8, 9, 10, 11, and 12			In shaft: 17, 18, 19, 20, 21, and 22			Total		
	Number	Percent of total	Rate per million man-hours	Number	Percent of total	Rate per million man-hours	Number	Percent of total	Rate per million man-hours	Number	Percent of total	Rate per million man-hours	Number	Percent of total	Rate per million man-hours	Number	Percent of total	Rate per million man-hours	Number	Percent of total	Rate per million man-hours			
Open stops, including room-and-pillar and sublevel stoping	303	13.60	9.64	423	18.99	13.46	25	1.12	0.79	335	15.04	10.66	70	3.14	2.23	1,032	46.32	32.83	40	1.79	1.79	2,228	100	70.88
Shrinkage	146	16.37	18.47	104	11.66	13.15	10	1.12	1.26	95	10.65	12.01	37	4.15	4.68	476	53.36	60.20	24	2.69	3.04	892	100	112.81
Cut-and-fill	289	20.63	23.00	133	9.49	10.59	6	.43	.48	139	9.92	11.06	78	5.75	6.21	719	51.32	57.23	37	2.64	2.95	1,401	100	111.52
Square-set	309	20.32	24.96	156	10.26	12.60	9	.59	.73	148	9.73	11.96	57	3.35	4.60	789	51.87	63.74	53	3.48	4.28	1,521	100	122.87
Block caving	141	24.02	27.82	34	5.79	6.71	4	.68	.79	42	7.16	8.29	17	2.90	3.35	343	58.43	67.68	6	1.02	1.18	587	100	115.82
Sublevel caving	43	36.44	9.05	7	5.93	1.47	7	5.93	1.47	7	5.93	1.47	8	6.78	1.84	43	36.44	9.05	3	2.55	.63	118	100	24.82
Top slicing	37	25.69	6.22	10	6.95	1.68	4	2.78	.67	38	12.88	2.75	5	3.47	2.89	81	56.25	13.62	144	100	24.22			
Open-cut, with power shovel	30	10.17	2.17	1	-----	-----	7	2.37	.51	1	25.00	6.48	40	13.56	2.89	180	61.02	13.01	-----	-----	-----	295	100	21.33
Open-cut, hand loading only	2	50.00	12.96	1	-----	-----	-----	-----	-----	1	25.00	6.48	1	25.00	6.48	-----	-----	-----	-----	-----	-----	4	100	25.92
Total	1,300	18.08	13.83	867	12.06	9.22	72	1.00	0.77	812	11.29	8.63	313	4.35	3.33	3,663	50.95	38.95	163	2.27	1.73	7,190	100	76.46

<sup>1</sup> Underground and open-cut only. No reports used for mines where less than 25 men were employed.

<sup>2</sup>No. 1 underground and No. 1 open-cut. Similarly, where two identical numbers appear throughout the remainder of the table, the first refers to underground and the second to open-cut. For a complete list of causes see table 6.

TABLE 26.—Accidents in 1939, by causes and mining methods, for selected companies

Method of mining	Underground										Shaft													
	Fall of rock or ore from roof or wall	Rock or ore during loading at work face	Hand tools	Explosives	Haulage	Falling down chute, winze, raise, or slope	Run of ore from chute or pocket	Drilling	Electricity	Machinery	Mine fires	Sulfation 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
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		17	18	19	20	21	22	
<b>Killed:</b>																								
Open stope, including room-and-pillar and sublevel stoping.....	15			7	5	7	1		1	1	1	1			1		37	1						1
Shrinkage.....	8	1		2	2	3											14	1						3
Cut-and-fill.....	5			3	1	3						1					6	2	1	2		1		4
Square-set.....	2			1	1	1	4	1	1								9	4						
Block caving.....	2			1		1											4							
Sublevel caving.....	1			1		1											3							
Top slicing.....																								
Total.....	34	1		14	9	18	5	1	1	1	2	2			3	89	4	1	2	1	1	1		8
<b>Injured:</b>																								
Open stope, including room-and-pillar and sublevel stoping.....	303	272	128	25	335	70	151	294	9	57	5	6	48	166	319	2,188	3	8	1		14	14	14	40
Shrinkage.....	146	50	78	10	95	37	54	145	1	22	7	7	29	68	126	868	2	3			6	13	6	24
Cut-and-fill.....	289	73	128	6	139	78	60	146	1	26	4	4	40	146	228	1,364	6	4	4	1	1	13	37	37
Square-set.....	309	136	133	9	148	57	20	105	2	34		1	19	219	276	1,468	2	8	8	1	8	36	53	6
Block caving.....	141	12	116	4	42	17	22	42	1	13			10	32	129	581	2	2	2		2	2	6	6
Sublevel caving.....	43	3	4	4	7	8	4	7	2	8			4	15	7	115	1	1			1	1		3
Top slicing.....	37	7	7	4	7	5	3	4		10			4	32	24	144								
Total.....	1,268	563	594	65	773	272	314	743	16	170	5	18	150	678	1,109	6,728	14	26	1	2	44	76	76	163



## PLACER MINES

Placer mining is represented in this publication by reports covering properties at which 14,775 men were employed in 1939. These men worked an average of 166 days each and a total of more than 19 million man-hours during the year, as shown in table 27. Accidents connected with the work caused 6 deaths and 688 nonfatal lost-time injuries among the employees, revealing a fatality rate of 0.31 and an injury rate of 35.00 per million man-hours worked.

Operation of placer deposits by dredging methods had the highest accident-frequency rate, the reports showing 46.11 accidents per million man-hours of work performed underground. The lowest rate was for surface operations, chiefly hand work, including sluicing.

Dredging employed more men than the other classes of placer workings—6,769 in all. Surface work, chiefly hand-operated, came next, with 5,377 employees. Hydraulicking properties employed 1,834 men. Only 795 employees were reported by underground placers.

In underground work fall of rock from roof or wall caused the largest number of accidents. In surface work falls of persons was the most prominent cause. Handling materials was the chief cause of accidents at dredging operations. Handling materials also resulted in the largest number of injuries at properties using hydraulicking methods. (See tables 27 to 30.)

The figures relating to placer mines do not cover all such mines in the United States, as it is impracticable to obtain reports from all of the many individuals working alone or in groups of two or three in various sections of the country who often devote only brief periods to such work. The figures in tables 27 to 30 are intended chiefly to show the principal causes of accidents at placer mines.

TABLE 27.—*Placer mines; Men employed, man-days of employment, and number killed and injured during the year ended Dec. 31, 1939*

	Under-ground	Surface	Dredging	Hydrau-licking	Total
Men employed.....	795	5,377	6,769	1,834	14,775
Man-days.....	154,463	553,599	1,542,784	201,650	2,452,496
Average days active.....	194	103	228	110	166
Man-hours of employment.....	1,269,731	4,431,458	12,382,229	1,572,982	19,656,400
Number killed.....	1	4	1	1	6
Number injured.....	35	55	571	27	688
Killed per million man-hours.....	0.79	0.32	0.32	0.64	0.31
Injured per million man-hours.....	27.56	12.41	46.11	17.16	35.00

TABLE 28.—*Placer mines; Severity of injury during the years ended Dec. 31, 1938 and 1939*

	1938					1939						
	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.....			1	29	30	30	1			35	35	36
Surface.....	1		1	133	134	135				55	55	55
Dredging.....			5	274	279	279	4		10	561	571	575
Hydraulicking.....	1		3	50	53	54	1			27	27	28
Total.....	2		10	486	496	498	6		10	678	688	694

TABLE 29.—Placer mines; Number killed and injured, by causes, during the years ended Dec. 31, 1938 and 1939

Cause	1938		1939	
	Killed	Injured	Killed	Injured
<b>Underground:</b>				
1. Fall of rock or ore from roof or wall.....		4		14
2. Rock or ore while loading at working face.....		4		2
3. Hand tools.....		3		5
4. Explosives.....				1
5. Haulage.....		3		4
6. Falling down chute, winze, raise, or stope.....		1		
7. Run of ore from chute or pocket.....				1
8. Drilling.....				1
9. Electricity.....				
10. Machinery (other than locomotives or drills).....		3		
11. Mine fires.....				
12. Suffocation from natural gases.....				
13. Inrush of water.....				
14. Stepping on nail.....				
15. Handling materials (other than rock or ore).....		5		3
16. Other causes.....		4		3
Total, underground.....		27		34
<b>Shaft:</b>				
17. Falling down shaft.....		2		1
18. Objects falling down shaft.....				
19. Breaking of cables.....				
20. Overwinding.....				
21. Skip, cage, or bucket.....			1	
22. Other causes.....		1		
Total, shaft.....		3	1	1
<b>Surface:</b>				
1. Mine cars, mine locomotives, or aerial trams.....		3		1
2. Railway cars and locomotives.....				
3. Run or fall of ore in or from ore bins.....				
4. Falls of persons.....		23		13
5. Stepping on nail.....		6		1
6. Hand tools.....		21		5
7. Electricity.....		2		3
8. Machinery.....		23		12
9. Handling materials.....		19		6
10. Other causes.....	1	37		14
Total, surface.....	1	134		55
<b>Dredging:</b>				
1. Machinery.....		66	1	73
2. Electricity.....		6		12
3. Boiler explosion or bursting steam pipe.....				
4. Falls of persons.....		67		111
5. Hand tools.....		24		88
6. Handling materials.....		51		114
7. Other causes.....		65	3	173
Total, dredging.....		279	4	571
<b>Hydrauliclicking:</b>				
1. Cave of bank.....		4	1	1
2. Explosives.....				
3. Hydraulic giants.....		5		2
4. Falls of persons.....		14		8
5. Rock while handling.....		10		1
6. Hand tools.....		5		1
7. Machinery, derricks, etc.....	1	2		
8. Handling materials (other than rock or ore).....		5		11
9. Other causes.....		8		3
Total, hydrauliclicking.....	1	53	1	27
Grand total.....	2	496	6	688

## MINES OPERATED WITHOUT FATAL ACCIDENTS

All of the 173 fatal accidents at metal and nonmetal mines in 1939 occurred at 141 mines. Reports from operating companies revealed that 8,993 mines were operated during the year without a fatal accident. Mines without fatal accidents employed 73 percent of the total number of men engaged in mining metallic and nonmetallic minerals in the United States and represented nearly 68 percent of the total number of man-hours worked in the entire industry. The 141 mines at which 173 men were killed by accidents were much larger, on the average, than those that had no fatalities; they averaged 213 men per mine compared with 9 per mine for the fatality-free properties. The fatality rate of mines having fatal accidents was 2.60 per million man-hours of employment compared with 0.84 for the industry as a whole. Their nonfatal-injury rate was 72.91 compared with 63.14 for mines that had no fatalities and 66.28 for the entire industry. (See table 30.)

The States that had no fatal accidents at metal and nonmetal mines in 1939 are shown in tables 31 and 32. Of the States that had fatal accidents, Oregon reported the highest percentage of its mine employees working in mines that operated without a fatality; 99 percent of its mine workers were employed in fatality-free mines. Tables 31 and 32 show the relative standing of the States, according to percentage of mine workers and man-hours represented by mines that had no fatal accidents.

TABLE 30.—*Comparative fatal and nonfatal accident data for metal and nonmetal mines (other than coal mines) in the United States in 1939*

	Mines that had no fatal accidents	Mines that had fatal accidents	All metal and nonmetal mines
Number of mines.....	8,993	141	9,134
Number of employees.....	81,923	29,986	111,909
Proportion of total employees..... percent	73.2	26.8	100
Number of employees per mine.....	9	21	12
Man-days of employment.....	17,743,660	8,288,708	26,032,368
Average worked per man..... days	217	276	233
Man-hours of employment.....	140,219,364	66,615,759	206,835,123
Average worked per man..... hours	1,712	2,222	1,848
Number of men killed.....	173	173	173
Number of men injured.....	8,853	4,857	13,710
Death rate per million man-hours.....	2.60	2.60	0.84
Injury rate per million man-hours.....	63.14	72.91	66.28

TABLE 31.—*Metal and nonmetal mines (other than coal mines): Number of men employed in 1939*

State	At mines that had fatalities	At mines that had no fatalities	Employees represented by mines that had no fatalities (percent)	State	At mines that had fatalities	At mines that had no fatalities	Employees represented by mines that had no fatalities (percent)
Texas.....		1, 673	100. 0	Tennessee.....	388	1, 252	76. 3
Virginia.....		998	100. 0	Colorado.....	1, 583	4, 822	75. 0
Arkansas.....		633	100. 0	Idaho.....	1, 567	4, 713	75. 0
North Carolina.....		529	100. 0	Alaska.....	1, 475	4, 062	73. 4
Pennsylvania.....		518	100. 0	United States.....	29, 986	81, 923	73. 2
Louisiana.....		441	100. 0	Missouri.....	733	1, 961	72. 8
Illinois.....		406	100. 0	Michigan.....	2, 440	6, 374	72. 3
Georgia.....		300	100. 0	Florida.....	309	732	70. 3
Other States <sup>1</sup> .....		168	100. 0	Utah.....	1, 729	3, 467	66. 7
South Carolina.....		144	100. 0	Arizona.....	3, 443	6, 369	64. 9
New Hampshire.....		141	100. 0	Nevada.....	2, 222	3, 565	61. 6
Iowa.....		134	100. 0	New Mexico.....	1, 136	1, 778	61. 0
Maine.....		90	100. 0	New Jersey.....	417	638	60. 5
Oregon.....	15	1, 486	99. 0	Montana.....	3, 946	5, 698	59. 1
Washington.....	32	1, 270	97. 5	Wyoming.....	189	102	35. 1
Oklahoma.....	66	2, 431	97. 4	Wisconsin.....	522	217	29. 4
Kentucky.....	50	954	95. 0	South Dakota.....	1, 648	549	25. 0
Kansas.....	135	1, 401	91. 2	Alabama.....	3, 488	1, 134	24. 5
California.....	1, 376	13, 711	90. 9	Vermont.....	134	22	14. 1
New York.....	139	1, 307	90. 4				
Minnesota.....	804	5, 733	87. 7				

<sup>1</sup> Includes Connecticut, Maryland, Massachusetts, Nebraska, Ohio, and West Virginia.

TABLE 32.—*Metal and nonmetal mines (other than coal mines): Number of man-hours worked in 1939*

State	At mines that had fatalities	At mines that had no fatalities	Man-hours represented by mines that had no fatalities	State	At mines that had fatalities	At mines that had no fatalities	Man-hours represented by mines that had no fatalities
Texas.....		3, 999, 330	Percent	Tennessee.....	770, 850	2, 466, 058	Percent
Virginia.....		1, 836, 470	100. 0	Missouri.....	1, 170, 272	3, 034, 684	76. 2
Pennsylvania.....		1, 337, 092	100. 0	Florida.....	668, 846	1, 421, 215	72. 2
Louisiana.....		1, 104, 954	100. 0	United States.....	66, 615, 759	140, 219, 364	68. 0
Arkansas.....		992, 828	100. 0	Colorado.....	3, 634, 313	7, 607, 769	67. 8
North Carolina.....		681, 033	100. 0	Idaho.....	3, 455, 929	6, 995, 453	67. 7
Illinois.....		676, 060	100. 0	Michigan.....	5, 780, 893	11, 215, 837	66. 9
South Carolina.....		442, 888	100. 0	Alaska.....	3, 314, 808	5, 680, 496	66. 0
Georgia.....		416, 903	100. 0	Utah.....	4, 629, 242	6, 731, 519	63. 1
Other States <sup>1</sup> .....		280, 843	100. 0	New Jersey.....	879, 542	1, 196, 964	59. 3
Iowa.....		215, 848	100. 0	Arizona.....	8, 796, 873	11, 440, 260	57. 6
New Hampshire.....		197, 413	100. 0	Montana.....	7, 664, 980	9, 241, 661	56. 8
Maine.....		82, 814	100. 0	Nevada.....	5, 348, 291	5, 916, 087	54. 7
Oregon.....	42, 188	2, 037, 631	98. 0	New Mexico.....	2, 601, 240	2, 479, 261	52. 5
Oklahoma.....	113, 666	3, 872, 839	97. 1	Wisconsin.....	1, 049, 056	429, 742	48. 8
Washington.....	64, 430	2, 143, 961	97. 1	Alabama.....	6, 517, 005	1, 954, 570	29. 1
Kentucky.....	116, 578	1, 307, 305	91. 8	South Dakota.....	4, 108, 342	999, 229	23. 1
Kansas.....	285, 378	2, 698, 513	90. 4	Wyoming.....	343, 928	79, 763	18. 8
California.....	3, 395, 804	25, 025, 019	88. 1	Vermont.....	190, 595	29, 046	13. 2
Minnesota.....	1, 470, 510	9, 702, 502	86. 8				

<sup>1</sup> Includes Connecticut, Maryland, Massachusetts, Nebraska, Ohio, and West Virginia.

## SUMMARY TABLES

Over a period of years, less than 2 out of every 100 accidents at metal and nonmetal mines in the United States result fatally. A classification of accidents during the 5-year period covered by table 33 shows that of every 100 accidents 1.3 were fatalities, 0.06 were permanent-total disabilities, 2.3 were permanent-partial disabilities, and 96.3 were temporary disabling injuries.

The number of accidents and the number of men employed at metal and nonmetal mines for a period of 29 years (1911 to 1939) are summarized in table 34. The table shows clearly the downward trend in number of workers from the early part of the period to 1932 and the gain in employment since 1932. Comparative accident rates for each year of the 29-year period are shown in table 35, classified according to principal kinds of mines.

TABLE 33.—All mines: Number of fatalities and injuries and fatality and injury rates per thousand 300-day workers, classified by severity of injury, 1930-39

NUMBER OF ACCIDENTS							
Severity of injury	Total, 1930-34	1935	1936	1937	1938	1939	Total, 1935-39
Fatal.....	747	164	199	219	156	173	911
Permanent total <sup>1</sup> .....	54	7	5	9	8	16	45
Permanent partial <sup>2</sup> .....	1,258	246	290	432	367	304	1,639
Temporary <sup>3</sup> .....	41,822	9,953	14,355	17,614	12,347	13,390	67,659
Total.....	43,881	10,370	14,849	18,274	12,878	13,883	70,254
RATES PER THOUSAND 300-DAY WORKERS							
Fatal.....	2.67	2.42	2.37	2.20	1.99	1.99	2.19
Permanent total <sup>1</sup> .....	.19	.10	.06	.09	.10	.18	.11
Permanent partial <sup>2</sup> .....	4.49	3.63	3.45	4.34	4.68	3.50	3.94
Temporary <sup>3</sup> .....	149.27	146.71	170.82	176.99	157.58	154.31	162.43
Total.....	156.62	152.86	176.70	183.62	164.36	159.99	168.67
Average number of 300-day workers per year.....	56,034.6	67,841	84,033	99,522	78,353	86,775	83,304.8

<sup>1</sup> 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.

<sup>2</sup> 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.

<sup>3</sup> Disability for more than remainder of day of accident.



TABLE 34.—*Number of men employed, man-days of employment, and number of men killed and injured at all mines (except coal mines) in the United States, 1911–39*

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	169,199	161,662	48,498,510	661	4.09	30,734	190.11
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	126,718	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
1933.....	204	57,016	38,807	11,642,113	95	2.45	5,925	152.68
1934.....	221	66,645	49,077	14,723,215	116	2.36	7,892	160.81
1935.....	220	92,314	67,841	20,352,372	164	2.42	10,206	150.44
Average for 5 years...	219	70,041	51,023	15,306,871	128	2.51	7,549	147.95
Average for 25 years...	271	128,482	118,677	36,603,019	411	3.46	26,328	221.85
1936.....	250	100,932	84,033	25,209,905	199	2.37	14,650	174.34
1937.....	252	118,429	99,522	29,856,610	219	2.20	18,055	181.42
1938.....	228	103,027	78,353	23,505,864	156	1.99	12,722	162.37
1939.....	233	111,909	86,775	26,032,368	173	1.99	13,710	157.99

TABLE 35.—United States metal and nonmetallic mineral mines: Accident rates per thousand 300-day workers, 1912-39

Year	Copper		Gold, silver, miscellaneous		Iron		Lead and zinc (Mississippi Valley)		Nonmetallic mineral		Total	
	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured
1912	4.53	258.4	4.32	93.0	3.96	241.8	4.28	158.3	1.66	66.4	4.09	190.1
1913	4.08	230.8	3.83	70.4	3.29	268.3	3.90	133.5	3.02	84.9	3.72	179.6
1914	3.85	312.2	4.06	126.9	3.78	224.1	4.32	189.0	3.73	90.9	3.92	211.9
1915	3.72	322.0	4.79	201.5	2.88	233.5	5.37	238.3	2.43	107.8	3.89	248.6
1916	3.64	319.6	4.05	190.8	3.41	240.2	3.14	263.1	3.00	144.7	3.62	250.6
1917	5.88	313.4	4.03	172.5	3.54	227.5	4.09	273.0	2.48	123.6	4.44	241.0
1918	3.45	322.1	4.27	185.2	3.45	185.5	3.58	319.5	1.67	104.7	3.57	237.1
1919	3.54	309.6	4.41	191.3	3.09	292.4	4.13	292.3	1.65	139.3	3.47	233.6
1920	3.43	323.2	4.20	204.8	2.34	200.5	3.27	328.0	2.89	161.9	3.16	242.0
1921	3.70	317.5	3.29	225.5	3.04	210.9	2.58	379.7	1.98	215.5	3.09	249.7
1922	3.00	320.8	5.35	260.3	3.00	177.4	2.64	464.2	2.39	247.5	3.54	268.5
1923	3.11	349.1	3.93	298.9	2.38	150.2	2.73	495.7	2.67	212.5	3.01	275.4
1924	3.55	347.8	4.99	297.8	2.95	151.0	2.76	464.2	1.94	178.7	3.51	278.0
1925	2.94	350.6	3.83	307.4	2.54	159.4	3.32	468.1	1.71	165.4	2.99	283.5
1926	3.45	288.3	3.27	299.5	4.23	133.9	3.05	304.2	2.62	190.7	3.47	245.0
1927	3.46	261.2	3.91	279.8	2.45	114.6	2.64	297.7	2.19	171.2	3.10	221.5
1928	3.03	221.0	2.60	268.7	2.16	98.1	1.02	295.7	2.13	168.6	2.50	205.6
1929	3.03	223.8	3.66	269.4	2.08	89.6	2.08	238.3	2.29	168.1	3.03	200.1
1930	2.76	193.5	4.49	239.7	2.68	81.4	1.63	176.6	.75	138.3	2.92	167.9
1931	3.01	152.5	2.88	190.0	1.91	52.7	2.56	176.6	1.63	124.3	2.53	139.6
1932	3.01	112.5	3.66	179.3	1.68	44.6	3.95	164.8	1.56	117.6	2.89	135.6
1933	2.49	139.3	3.20	204.0	1.42	50.6	.85	147.6	1.39	129.3	2.45	152.7
1934	1.96	109.0	3.33	229.5	1.79	48.3	.91	196.1	1.23	121.3	2.36	160.8
1935	2.05	157.8	2.86	182.7	2.15	42.9	2.26	166.0	1.01	116.9	2.42	150.4
1936	2.62	194.2	2.70	224.8	2.01	60.3	3.33	135.5	.45	116.5	2.37	174.3
1937	2.26	228.0	2.60	226.2	1.73	72.6	1.47	123.8	1.52	115.6	2.20	181.4
1938	1.66	145.4	2.27	220.1	1.09	38.5	3.38	137.1	.80	96.7	1.99	162.4
1939	2.17	141.6	2.08	219.2	1.55	40.6	2.88	139.2	1.37	98.2	1.99	158.0

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