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QUARRY ACCIDENTS

IN THE
UNITED STATES

DURING THE CALENDAR YEAR

1930

BY
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QUARRY ACCIDENTS IN THE UNITED STATES DURING THE CALENDAR YEAR 1930¹

By WILLIAM W. ADAMS²

INTRODUCTION

Reports received from quarry-operating companies throughout the United States revealed a better safety record in 1930 than the industry has ever known. In no previous year has the combined number of deaths and injuries from accidents been as low, in proportion to the number of men employed, as in 1930. The apparently lower rates for 1911 to 1913, the first years accidents were reported by quarries, reflect incompleteness of data, particularly as regards very minor injuries, rather than genuinely lower accident rates. The death rate³ during 1930, which was 1.53 per thousand workers, was 7 per cent lower than the rate of 1.65 during 1929 and lower than that of any other year except 1928 when the rate was 1.46. The injury rate, which indicated 108 injuries per thousand employees as compared with 128 in 1929, was lower than the corresponding rate for any year since complete records of injuries became available.

A total of 80,633 employees at quarries was reported to the Bureau of Mines by operating companies, a reduction of 6 per cent from the number employed in 1929. The man-days of labor performed was 20,559,372, or 10 per cent less than in 1929, and the average number of workdays per man was 255 as compared with 268 the preceding year. Accidents resulted in 105 deaths and 7,417 injuries; the corresponding record for the previous year was 126 deaths and 9,810 injuries. Reported injuries include those which result in disability for more than the remainder of the day on which the accident occurred.

Nearly all of the nonfatal injuries—7,152 of them—resulted in disability of a temporary nature; but 253 of the injuries caused partial disability of a permanent character and 12 injuries caused total permanent disability to the injured employees.

Outstanding among the causes of fatal accidents in the quarry pits were falls or slides of rock or overburden, explosives, and machinery. These three classes of accidents accounted for considerably more than half of all fatalities to quarry workers. Fatal accidents to men employed at crushers and mills or on other classes of work outside the quarries were largely due to machinery, falls of persons, and falling objects.

¹ Work completed on manuscript Mar. 11, 1932. Miss Lillian Chenoweth, assisted by Miss E. V. Walters and Miss Virginia Erwin, prepared the statistical tables presented herein.

² Chief statistician, demographical division, U. S. Bureau of Mines.

³ All accident rates in the publication are, unless otherwise stated, adjusted to a year of 300 workdays.

The chief cause of nonfatal injuries to employees inside the quarries was handling materials. More than one-fourth of the total number of injuries came within this class. Other important causes of accidents were flying objects, falls or slides of rock or overburden, haulage, and machinery. Injuries of a nonfatal character to employees at plants outside the pits were caused chiefly by flying objects, handling materials, and machinery.

As the reports from operating companies do not give full particulars regarding each accident, the amount of time lost by the injured employees as a result of accidents in 1930 can only be estimated. Assuming an average loss of time for each class of accidents, as shown on page 72, the deaths and injuries from accidents in the quarry and related injuries in 1930 represent a loss of time or period of disability equal to 975,920 man-days. This estimate indicates an average of 4.7 days of disability for each hundred man-days worked in the industry during the year.

TABLE 1.—Number of men employed, days of labor performed, and number of men killed and injured at all quarries in the United States, 1911 to 1930

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.....	228	110,954	84,417	25,325,094	188	2.23	5,390	63.85
1912.....	249	113,105	93,837	28,151,042	213	2.27	6,552	69.82
1913.....	246	106,278	87,141	26,142,237	183	2.10	7,739	88.81
1914.....	233	87,936	68,187	20,456,157	180	2.64	7,836	114.92
1915.....	246	100,740	82,447	24,734,224	148	1.80	9,671	117.30
Average for 5 years....	240	103,803	83,206	24,961,750	182	2.19	7,437	89.39
1916.....	253	90,797	76,457	22,937,178	173	2.26	13,427	175.62
1917.....	261	82,290	71,525	21,457,357	131	1.83	13,242	185.14
1918.....	260	68,332	59,285	17,785,504	125	2.11	8,719	147.07
1919.....	253	75,505	63,794	19,138,308	123	1.93	9,199	144.20
1920.....	267	86,488	77,089	23,126,648	178	2.31	11,217	145.51
Average for 5 years....	259	80,682	69,630	20,888,999	146	2.10	11,161	160.29
Average for 10 years....	249	92,243	76,418	22,925,375	164	2.15	9,299	121.69
1921.....	233	77,185	59,958	17,987,547	120	2.00	10,465	174.54
1922.....	261	79,081	68,861	20,658,338	132	1.92	11,839	171.93
1923.....	276	92,455	85,153	25,545,859	143	1.68	14,990	176.04
1924.....	269	94,242	84,426	25,327,858	138	1.63	14,777	175.03
1925.....	273	91,872	83,487	25,045,955	149	1.78	14,165	169.67
Average for 5 years....	263	86,967	76,377	22,913,111	136	1.78	13,247	173.44
1926.....	271	91,146	82,361	24,708,400	154	1.87	13,201	160.28
1927.....	271	91,517	82,609	24,782,561	135	1.63	13,459	162.92
1928.....	272	89,667	81,325	24,397,377	119	1.46	10,568	129.95
1929.....	268	85,561	76,559	22,967,579	126	1.65	9,810	128.14
1930.....	255	80,633	68,531	20,559,372	105	1.53	7,417	108.23
Average for 5 years....	268	87,705	78,277	23,483,058	128	1.64	10,891	139.13

ACKNOWLEDGMENTS

The Bureau of Mines gratefully acknowledges the cooperation of quarry operators throughout the United States, whose voluntary reports of accidents and employment form the basis of the tables in this bulletin.

SCOPE OF STATISTICS

The tables in this paper have been compiled by the Bureau of Mines from reports received directly from operators of quarries (except for California, from which reports for quarries were received through the State Industrial Accident Commission), and they represent all stages of the quarrying industry. The total figures are based on returns representing 1,335 operators, whose 1,555 quarries were worked all or part of the year. The figures also cover crushing and screening, rock dressing, and the manufacture of lime and cement so far as those operations are conducted by the quarry companies.

The Bureau of Mines is authorized to collect data on accidents at mines and quarries, but there is no Federal law that compels operators to supply such data; hence the reports received from operators are voluntary responses to the bureau's requests for information. Although the figures presented herein may not be complete for the entire industry, every effort has been made to make them so, and the figures given are believed to be thoroughly representative of the hazards to which quarry workers are exposed. Moreover, the figures are comparable as between State and State, a fact extremely significant in view of the lack of uniformity among the States as regards classes of plants covered by State records, classes of accidents covered by State laws, and other factors that tend to make impracticable or impossible the comparison of the accident experience of one State with that of another.

CLASSIFICATION OF INJURIES

From 1915 to 1929 the bureau's statistics of accidents at quarries have divided all injuries into five main classes, as follows: (1) Fatalities, (2) permanent total disabilities, (3) permanent partial disabilities, (4) temporary disabilities lasting more than 14 days, and (5) temporary disabilities lasting more than the remainder of the shift on which the accident occurred but not exceeding 14 days. Beginning with 1930, classes (4) and (5) were consolidated under the general class of temporary injuries.

Tables 2 and 3 contain 5-year total figures for 1916 to 1920, 1921 to 1925, and 1926 to 1930 and yearly figures for 1926 to 1930. During the most recent five years of this period 55,094 accidents at quarries were reported to the Bureau of Mines. Of these, 639 (1.16 per cent) resulted fatally, 52 (0.09 per cent) caused permanent total disability, 1,670 (3.03 per cent) caused permanent partial disability, and 52,733 (95.72 per cent) caused disability for more than the remainder of the day or shift on which the accident occurred. During this period more than 117,000,000 shifts were worked by all quarry employees, so that the volume of exposure to occupational hazards indicates that the foregoing distribution of accidents may be accepted as typical of the severity of accidents to workers in the industry.

TABLE 2.—Number of quarry accidents, 1916 to 1930

Injury	Total, 1916- 1920	Total, 1921- 1925	1926	1927	1928	1929	1930	Total, 1926- 1930
Fatal.....	730	682	154	135	119	126	105	639
Permanent total ¹	76	76	15	7	13	5	12	52
Permanent partial ²	1,537	2,025	416	358	348	295	253	1,670
Temporary ³	54,191	64,135	12,770	13,094	10,207	9,510	7,152	52,733
Total.....	56,534	66,918	13,355	13,594	10,687	9,936	7,522	55,094
Men employed per year.....	80,682	86,967	91,146	91,517	89,667	85,561	80,633	87,705

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

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

³ Disability for more than remainder of day of accident.

TABLE 3.—Accident rates per thousand 300-day workers, classified by severity of injury, 1916 to 1930

Injury	Total, 1916- 1920	Total, 1921- 1925	1926	1927	1928	1929	1930	Total, 1926- 1930
Fatal.....	2.097	1.786	1.870	1.634	1.463	1.646	1.532	1.633
Permanent total ¹.....	.218	.199	.182	.085	.160	.065	.175	.133
Permanent partial ²	4.415	5.303	5.051	4.333	4.279	3.853	3.692	4.267
Temporary ³	155.654	167.943	155.049	158.506	125.509	124.218	104.362	134.734
Total.....	162.384	175.231	162.152	164.558	131.411	129.782	109.761	140.767
Average number of 300-day workers per year.....	69,630	76,377	82,361	82,609	81,325	76,559	68,531	78,277

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

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

³ Disability for more than remainder of day of accident.

TABLE 4.—All quarries: Men employed and days of labor performed, by kinds of quarries, during the year ended December 31, 1930

Kind of quarry	Active operators	Men employed			Days of labor performed			Average days active		
		In and about quarry	In outside works	Total	In and about quarry	In outside works	Total	In and about quarry	In outside works	Total
1930										
Cement rock.....	102	3,590	16,408	19,998	918,273	5,046,675	5,964,948	256	308	298
Granite.....	231	5,571	4,843	10,414	1,291,316	1,206,078	2,497,394	232	249	240
Limestone.....	656	21,319	12,874	34,193	4,881,662	3,409,156	8,290,818	229	265	242
Marble.....	41	2,352	3,735	6,087	612,936	1,067,365	1,680,301	261	286	276
Sandstone and bluestone.....	131	2,377	1,168	3,545	474,947	278,027	752,974	200	238	212
Slate.....	62	1,588	1,367	2,955	340,338	296,640	636,978	214	217	216
Trap rock.....	112	2,276	1,165	3,441	480,978	254,981	735,959	211	219	214
Total, 1930.....	1,335	39,073	41,560	80,633	9,000,450	11,558,922	20,559,372	230	278	255
1929										
Cement rock.....	101	3,817	16,870	20,687	1,057,154	5,455,835	6,512,989	277	323	315
Granite.....	246	6,293	4,902	11,195	1,532,359	1,241,312	2,773,671	244	253	248
Limestone.....	689	23,693	12,441	36,134	5,822,810	3,476,807	9,299,617	246	279	257
Marble.....	37	2,631	4,027	6,658	704,364	1,206,470	1,910,834	268	300	287
Sandstone and bluestone.....	134	2,592	1,144	3,736	530,641	231,574	762,215	205	202	204
Slate.....	67	2,116	1,436	3,552	529,104	367,935	897,039	250	256	253
Trap rock.....	108	2,551	1,048	3,599	560,451	250,763	811,214	220	239	225
Total, 1929.....	1,382	43,693	41,868	85,561	10,736,883	12,230,696	22,967,579	246	292	268

TABLE 5.—All quarries: Number killed and injured, by kinds of quarries, during the year ended December 31, 1930

Kind of quarry	Number killed			Number injured. (Time lost, more than 1 day)			Widows	Orphans
	In and about quarry	In outside works	Total	In and about quarry	In outside works	Total		
1930								
Cement rock	4	13	17	300	378	678	14	27
Granite	8	4	12	672	519	1,191	7	13
Limestone	41	8	49	2,659	1,287	3,946	33	94
Marble	4	2	6	231	281	512	6	12
Sandstone and bluestone	6	1	7	222	83	305	4	9
Slate	1	—	1	202	121	323	—	—
Trap rock	10	3	13	366	96	462	8	12
Total, 1930	74	31	105	4,652	2,765	7,417	72	167
1929								
Cement rock	10	16	26	294	650	944	20	44
Granite	17	6	23	842	673	1,515	16	40
Limestone	35	23	58	3,689	1,626	5,315	29	50
Marble	3	2	5	268	341	609	2	9
Sandstone and bluestone	1	—	1	280	63	343	1	—
Slate	2	—	2	334	155	492	1	5
Trap rock	10	1	11	466	126	592	4	6
Total, 1929	78	48	126	6,173	3,637	9,810	73	154

TABLE 6.—All quarries: Fatalities and injuries per thousand 300-day workers employed during the years ended December 31, 1911 to 1930

Kind of quarry	Number of 300-day workers			Killed per thousand 300-day workers			Injured per thousand 300-day workers		
	In and about quarry	In outside works	Total	In and about quarry	In outside works	Total	In and about quarry	In outside works	Total
1930									
Cement rock	3,061	16,822	19,883	1.31	0.77	0.86	98.01	22.47	34.10
Granite	4,305	4,020	8,325	1.86	1.00	1.44	156.10	129.10	143.06
Limestone	16,272	11,364	27,636	2.52	.70	1.77	163.41	113.25	142.78
Marble	2,043	3,558	5,601	1.96	.56	1.07	113.07	78.98	91.41
Sandstone and bluestone	1,583	927	2,510	3.79	1.08	2.79	140.24	89.84	121.51
Slate	1,134	989	2,123	.88	—	.47	178.13	122.35	152.14
Trap rock	1,603	850	2,453	6.24	3.53	5.30	228.32	112.94	188.34
Total, 1930	30,001	38,530	68,531	2.47	0.80	1.53	155.06	71.76	108.23
1929									
Cement rock	3,524	18,186	21,710	2.84	0.88	1.20	83.43	35.74	43.48
Granite	5,108	4,138	9,246	3.33	1.45	2.49	164.84	162.64	163.85
Limestone	19,409	11,590	30,999	1.80	1.98	1.87	190.07	140.29	171.46
Marble	2,348	4,021	6,369	1.28	.50	.79	114.14	84.80	95.62
Sandstone and bluestone	1,769	772	2,541	.57	—	.39	158.28	81.61	134.99
Slate	1,764	1,226	2,990	1.13	—	.67	189.34	128.87	164.55
Trap rock	1,863	836	2,704	5.35	1.20	4.07	249.46	150.72	218.93
Total, 1929	35,790	40,769	76,559	2.18	1.18	1.65	172.48	89.21	128.14
Total, 1928	38,760	42,565	81,325	1.99	0.99	1.46	162.46	100.34	129.95
Total, 1927	41,421	41,188	82,609	2.39	.87	1.63	193.50	132.17	162.92
Total, 1926	42,708	39,653	82,361	2.58	1.11	1.87	187.46	131.01	160.28
Total, 1925	44,263	39,224	83,487	2.28	1.22	1.78	195.02	141.06	169.67
Total, 1924	50,506	33,920	84,426	1.90	1.24	1.63	178.00	170.61	175.03
Total, 1923	50,226	34,927	85,153	1.97	1.26	1.68	178.11	173.05	176.04
Total, 1922	39,788	29,073	68,861	2.31	1.38	1.92	177.16	164.76	171.93
Total, 1921	36,082	23,876	59,958	2.22	1.68	2.00	167.09	185.79	174.54
Total, 1920	45,617	31,472	77,089	2.81	1.59	2.31	139.62	154.04	175.51
Total, 1919	39,278	24,516	63,794	2.29	1.35	1.93	146.65	140.28	144.20
Total, 1918	37,042	22,243	59,285	2.19	1.98	2.11	148.29	145.03	147.07
Total, 1917	45,449	26,076	71,525	2.00	1.53	1.83	162.95	223.81	185.14
Total, 1916	49,077	27,380	76,457	2.32	2.15	2.26	158.63	206.06	175.62
Total, 1915	54,832	27,615	82,447	2.17	1.05	1.80	127.57	96.90	117.30
Total, 1914	(1)	(1)	68,187	—	—	2.64	—	—	114.92
Total, 1913	(1)	(1)	87,141	—	—	2.10	—	—	88.81
Total, 1912	(1)	(1)	93,837	—	—	2.27	—	—	69.82
Total, 1911	(1)	(1)	84,417	—	—	2.23	—	—	63.85

¹ Not segregated prior to 1915.

DEFINITION OF ACCIDENT RATES

As previously stated, all accident-frequency rates mentioned in this publication indicate the number of accidents for each 300,000 man-shifts of exposure or, otherwise stated, the number of accidents per thousand 300-day employees. These rates are based upon the number of man-shifts as reported by the operators and do not take into consideration the number of hours constituting a standard shift, as many operators do not report to the Bureau of Mines the number of hours per day that their plants operate. Other operators do, however, report these data, and special tables (see Tables 33 to 42) have been prepared to present the accident and employment statistics for various quarries, according to the length of the workday.

QUARRIES CLASSIFIED

The quarries covered by this report have been classified, according to the kind of rock, as follows: Cement rock, granite, limestone, marble, sandstone and bluestone, slate, and trap rock. Separate statistical tables are presented for each group and for all of the groups combined. Clay pits, sand pits, and sand-and-gravel pits are not included.

CEMENT-ROCK QUARRIES

Progress in safety at quarries and mills in the cement industry continued through 1930. The improvement was shown by further reductions both in injury and fatality rates. A lower fatality rate was reported not only for the quarry pits proper but for the cement mills and other work outside the quarries. The nonfatal injury rate for the quarries proper was higher than in the preceding year, but, as a substantial reduction was made in the rate for the mills, the combined rate for both quarries and mills indicated a material improvement as compared with 1929.

Progress in safety in the cement industry in 1930 was a continuation of the progress which that industry has been making for a number of years and for which the industry has a justifiably enviable record.

Reports from operating companies showed 19,998 men employed, a reduction of 689 from the number of men employed in the preceding year. The amount of work done—5,964,948 man-shifts—represented a reduction of 8 per cent. The average employee worked 298 days, or 17 days less than in 1929.

Accidents caused 17 deaths and 678 injuries, resulting in a fatality rate of 0.86 and an injury rate of 34 per thousand employees, both rates being adjusted to a 300-day standard. Corresponding rates for the previous year were 1.20 for fatalities and 43 for nonfatal lost-time injuries. Men working inside the quarries had a fatality rate of 1.31, as against 2.84 in 1929, and an injury rate of 98, as compared with 83 in 1929. This increase for the pit workers was the only instance where the accident rate for cement plants did not decline. Cement mills, as distinguished from quarry pits, had a fatality rate of 0.77, indicating an improvement over the previous year's rate of 0.88, and an injury rate of 22 as compared with 36 in 1929.

The 17 fatal accidents in 1930 were distributed among 8 causes, the most prominent being machinery and falls of persons, with 4

fatalities each. Nonfatal injuries on the other hand, although even more widely distributed as to cause, revealed several classes of accidents that stood out above the others. The chief causes of nonfatal injuries inside the quarries were handling materials, falls or slides of rock or overburden, drilling, and haulage; while at outside plants the principal classes of accidents were falls of persons, machinery, burns, handling materials, and flying objects.

All of the 695 injuries and deaths from accidents at cement-rock quarries, crushers, and mills in 1930 caused a loss of time or period of personal disability which has been estimated at 145,000 man-days, an average of 209 lost days per accident. The estimated loss of time from all accidents represents 2.4 days of disability for each hundred man-shifts worked.

Most quarries producing stone for the manufacture of cement were operated either 8 or 10 hours a day. Each of these groups accounted for about 35 per cent of all employees at quarries where cement was manufactured. For cement mills, or plants outside the quarries, the prevailing shift was 8 hours a day, while a smaller number of plants worked a 10-hour shift. Table 35 indicates the number of employees, classified according to the length of working day.

MARBLE QUARRIES

The marble industry, in common with other branches of quarrying, lowered its accident-frequency rate in 1930. Reports from operating companies showed that the number of accidents (including all injuries and deaths) in proportion to the number of men employed was reduced 4 per cent. The number of men employed was about 9 per cent less than in 1929, and the aggregate number of man-days of labor performed declined about 12 per cent. The average period of employment was 261 work-days per man, as compared with 268 in 1929.

According to reports from companies operating marble quarries 6,087 men were employed in 1930, with a volume of work equal to 1,680,301 man-days. These figures are based upon reports from 41 companies, some of whom operated two or more plants.

Accidents at the quarries and outside shops resulted in 518 injuries, of which 6 resulted fatally. The nonfatal injuries occurred at the rate of 91 for each thousand employees (adjusted to a 300-workday basis), as compared with 96 in the previous year. The fatality rate, which was 1.07, was higher in 1930 than in 1929, owing to an increase of 1 in the number of men killed and a material decrease in the number of man-days of labor performed. The chief cause of fatalities was machinery, to which 3 out of the 6 deaths were attributed. Flying objects, drilling and channeling, falls of persons, machinery, and falling objects were the outstanding causes of nonfatal injuries at the quarries; while at outside works important contributing causes of accidents were handling materials, flying objects, machinery, falls of persons, and falling objects.

The 518 accidents that occurred in 1930 were classified as follows: 6 fatal, 12 permanent partial disabilities, and 500 temporary injuries causing 1 or more days of disability. These fatalities and injuries represented a loss of time, or period of disability, estimated at 51,000 man-days, or 3 man-days of disability for every hundred man-shifts worked by all employees at the plants during the year. The corre-

sponding record for the previous year showed 2.5 days of disability for each hundred man-shifts worked.

Nine hours a day was the standard shift for 47 per cent of all employees at marble quarries in 1930, and 10 hours a day for 41 per cent of all employees; the other 12 per cent was divided between the 8-hour-a-day and the miscellaneous group. For rock dressing or other nonquarry work the 9-hour day was the established workday for 69 per cent of the employees and the 10-hour day for 23 per cent of the workers. (See Table 35.)

SLATE QUARRIES

Further progress in safety marked the operation of slate quarries in 1930. The injury rate, as well as the fatality rate, was reduced below the 1929 level, which was more favorable than the rates for most of the years of the preceding decade. Fewer men were employed at the quarries, the reduction being about 17 per cent below the previous years. Employment, as measured by the number of man-shifts worked, fell off about 29 per cent.

According to operators' reports, 2,955 men were employed and 636,978 shifts were worked during the year, an average of 216 days per man as compared with 253 days per man in the preceding year.

Accidents resulted in 1 fatality and 323 injuries, the fatality rate per thousand 300-day workers being 0.47 and the injury rate 152; the corresponding figures for the previous year were 0.67 and 165, respectively.

The single fatality during the year was charged to handling materials. Most of the nonfatal injuries in and about the quarries were due to handling materials. Other leading causes, each of much less importance than handling materials, were falls or slides of rock or overburden, flying objects, falls of persons, and falling objects. The principal causes of accidents at outside works were handling materials, flying objects, falls of persons, and hand tools.

The injuries and deaths from accidents at slate quarries and outside plants during the year represent a period of disability estimated at 19,000 man-days. The basis for this estimate is explained on page 72. This estimated loss of time from accidents represents 2.9 man-days of disability for each hundred man-shifts worked by all employees at slate quarries and outside works during 1930.

More than half of all of the men employed at slate quarries in 1930 worked at plants that were operated 9 hours a day; about one-third of the number were employed at quarries operated 8 hours a day. Nearly one-half of the men engaged in nonquarry work were employed 9 hours a day, and one-third were employed 8 hours a day. Figures showing these facts are given in Table 35.

TRAP-ROCK QUARRIES

Companies that operated trap-rock quarries in 1930 succeeded in lowering the nonfatal-injury rate at their plants, but experienced an increase in the fatal-accident rate. The number of injuries per thousand employees was reduced from 219 in 1929 to 188 in 1930, but the fatality rate rose from 4.07 to 5.30. The increased fatality rate was due to the fact that the actual number of fatalities increased from 11 to 13, or 18 per cent, while the number of man-days worked

during the year declined 9 per cent. On the other hand, the reduction in the nonfatal-injury rate was the net result of a reduction of 22 per cent in the actual number of injuries and a decline of only 9 per cent in the number of man-days worked.

Five of the 13 fatal accidents at trap-rock quarries were caused by falls or slides of rock or overburden and 4 were caused by machinery; 3 of the latter accidents occurred outside the quarries. The rates for nonfatal injuries increased for injuries caused by handling materials; however, this increase was more than offset by lower accident rates for falls or slides of rock or overburden, flying objects, falling objects, and several other causes. Rates for various classes of nonfatal accidents are given in Table 21.

The number of men working in 1930 was 3,441, which was not much less than that for the previous year (3,599), but the volume of work done declined more seriously—from 811,214 to 735,959 man-days.

As previously stated, 13 deaths resulted from accidents during the year. Nonfatal injuries numbered 462. The nonfatal injuries included 1 case of permanent total disability, 13 cases of permanent partial disability, and 448 temporary injuries involving the disability of the injured employee for one day or more. It is estimated that these injuries, together with the 13 deaths, represent a loss of productive time equal to 98,880 man-days. This estimate indicates a loss from accidents of 13.4 days for each hundred man-shifts worked during the year, as compared with the preceding year's record of 9.9 days of disability per hundred man-shifts.

Eight hours a day was the standard workday for quarries that employed 31 per cent of all men at trap-rock quarries in 1930, while 9 hours was the standard for 26 per cent of the men and 10 hours for an equal percentage. The standard workday for men working outside of the quarries was 9 hours for 34 per cent of the men and 10 hours for 30 per cent of the men.

QUARRY ACCIDENTS IN THE UNITED STATES, 1930

TABLE 7.—Cement-rock, marble, slate, and trap-rock quarries: Men employed, number killed and injured, and days worked, by States, during the year ended December 31, 1930

State	In and about quarry						In outside works						Total						Wid- ows	Or- phans
	Men em- ployed	Days of labor per- formed	Aver- age days active	Killed	In- jured	Men em- ployed	Days of labor per- formed	Aver- age days active	Killed	In- jured	Active oper- ators	Men em- ployed	Days of labor per- formed	Aver- age days active	Killed	In- jured				
Cement rock:																				
California.....	349	94,689	271	1	178	1,257	401,073	319	2	81	8	1,606	495,772	309	3	259	3	12		
Illinois.....	252	74,363	295	1	3	1,132	373,766	324	2	2	5	1,404	448,129	319	3	17	2	2		
Kansas.....	189	52,487	278		8	1,760	227,989	300	2	6	7	1,949	280,476	296	2	14	2	2		
New York.....	200	52,669	263		9	1,265	407,309	322		17	7	1,465	459,978	314		26				
Pennsylvania.....	738	181,675	246	1	13	3,258	986,267	303	2	23	16	3,995	1,167,842	292	3	36	3	8		
Not segregated.....	1,862	462,380	248	1	87	8,716	2,650,271	304	5	249	59	10,578	3,112,651	294	6	336	4	3		
Total, 1930.....	3,590	918,273	256	4	300	16,408	5,046,675	308	13	378	102	19,998	5,964,948	298	17	678	14	27		
Marble:																				
California.....	46	12,435	270		6	19	5,160	272		2	5	65	17,595	271		8				
Massachusetts.....	45	13,280	295			41	12,486	305		2	4	86	25,766	300						
Tennessee.....	1,065	249,820	228	2	100	835	205,580	246	2	34	9	1,930	455,400	236	2	134	2	5		
Not segregated.....	1,166	337,401	289	2	125	2,840	844,139	287	2	243	23	4,006	1,181,540	295	4	368	4	7		
Total, 1930.....	2,352	612,936	261	4	231	3,735	1,067,365	286	2	281	41	6,087	1,680,301	276	6	512	6	12		
Slate:																				
Pennsylvania.....	892	195,278	219		96	875	195,607	224		77	29	1,767	390,885	221		173				
Vermont.....	338	81,180	241	1	40	182	42,569	254	23	17	3	520	123,689	238	1	63				
Virginia.....	167	22,850	137		32	141	21,100	150	14	3	308	43,950	143		46					
Not segregated.....	161	41,080	215		34	169	37,424	221	7	13	13	360	78,434	218		41				
Total, 1930.....	1,588	340,338	214	1	202	1,367	296,640	217	121	62	62	2,955	636,978	216	1	323				
Trap rock:																				
California.....	320	69,211	216	2	72	160	37,546	235	22	27	27	480	106,757	222	2	94	2	2		
Connecticut.....	264	69,388	263		15	82	23,762	280	13	6	6	346	93,120	269		28				
Maryland.....	181	35,282	195		37	62	12,462	201	5	7	243	47,744	196		42					
Massachusetts.....	315	59,219	188	3	91	149	26,322	177	2	25	15	464	55,941	184	5	16	4	7		
New Jersey.....	622	128,051	206	3	59	252	46,374	184	11	24	874	174,425	220	3	70					
New York.....	100	23,050	231	2	33	98	22,372	228	1	6	4	198	45,422	239	3	39	2			
Pennsylvania.....	273	56,400	207		38	275	70,018	255	12	15	548	126,418	231		50					
Not segregated.....	201	40,407	201		21	87	16,125	185		2	14	288	56,532	196		23				
Total, 1930.....	2,276	480,978	211	10	366	1,165	254,981	219	96	112	112	3,441	735,959	214	13	462	8	12		

GRANITE QUARRIES

The granite-quarrying industry continued its progress in safety in 1930 by reducing the frequency of both fatal and nonfatal accidents. A loss of 7 per cent was recorded in the number of men working, which was accompanied by a decline of 10 per cent in the total volume of work as measured by the number of man-days worked. The average number of days of work per man was 8 less than in the previous year, or 240 days in 1930 as compared with 248 in 1929.

According to reports from operating companies, 10,414 men worked 2,497,394 man-days in 1930. Accidents caused 12 fatalities and 1,191 injuries, indicating a fatality rate of 1.44 and an injury rate of 143 per thousand full-time employees, as compared with 2.49 and 164, respectively, in 1929. Four fatalities were due to falls or slides of rock or overburden, and the remainder were due to various causes. Accidents that resulted in injuries of a nonfatal character were mainly due to flying objects at the shops outside the quarries and to handling materials and flying objects inside the quarry pits.

Among the nonfatal injuries the reports showed 27 permanent partial disabilities and 1,164 temporary injuries. These injuries and the 12 deaths from accidents during the year represent a loss of time equal to 105,240 man-days, an average of 4.2 days per hundred man-days of work during the year.

Eight hours a day was the standard workday for quarries that employed 64 per cent of all granite-quarry men in 1930 and 10 hours was the standard for 14 per cent of the men. The standard workday for men working outside of the quarries was 8 hours for 79 per cent of the men and 9 hours for 4 per cent.

TABLE 8.—Granite quarries: Men employed, number killed and injured, and days worked, by States, during the year ended December 31, 1930

State	In and about quarry					In outside works					Total					Wid- ows	Or- phans
	Men em- ployed	Days of labor per- formed	Aver- age days active	Killed	In- jured	Men em- ployed	Days of labor per- formed	Aver- age days active	Killed	In- jured	Men em- ployed	Days of labor per- formed	Aver- age days active	Killed	In- jured		
California	546	139,598	256	2	101	607	153,923	254	1	29	1,153	293,451	255	2	130	1	2
Connecticut	117	31,982	273	1	9	91	23,742	261	1	7	208	55,724	268	2	16	1	2
Georgia	415	91,984	222	1	14	411	104,692	255	1	13	826	196,656	238	1	27	1	4
Maine	676	142,171	270	1	57	355	72,266	204	1	23	1,031	214,437	208	1	80	1	3
Massachusetts	479	109,836	230	1	81	649	166,965	257	1	152	27	1,128	245	1	233	1	3
Minnesota	378	92,663	245	1	83	686	180,735	278	1	49	20	283,398	266	1	132	1	3
New Hampshire	280	61,002	238	1	30	405	106,683	263	1	66	16	168,584	254	1	96	1	3
North Carolina	653	130,598	200	1	38	515	135,500	263	1	51	8	266,098	228	1	89	1	3
Oregon	24	3,904	165	1	1	28	3,584	128	1	8	4	7,548	145	1	9	1	3
Pennsylvania	85	20,277	239	1	17	37	9,916	268	1	2	10	30,193	247	1	19	1	3
Rhode Island	56	13,769	245	1	1	56	16,200	289	1	5	6	29,909	267	1	6	1	3
Texas	70	18,330	262	1	16	23	6,566	285	1	3	5	24,896	268	1	19	1	3
Vermont	882	236,141	268	1	104	272	42,250	155	1	45	18	278,391	241	1	149	1	3
Virginia	164	37,310	228	1	22	40	9,782	244	1	1	4	47,072	231	1	23	1	3
Washington	43	7,288	151	1	14	14	3,038	217	1	7	62	10,296	166	1	10	1	3
Wisconsin	331	80,041	242	1	35	398	101,457	255	1	22	12	181,498	249	1	57	1	3
Not segregated	387	73,542	190	1	63	256	88,800	230	1	43	25	132,342	206	2	106	2	2
Total, 1930	5,571	1,291,316	232	8	672	4,843	1,206,078	249	4	519	231	2,497,394	240	12	1,191	7	13

LIMESTONE QUARRIES

More than half of all quarry-pit workers in the United States are engaged in producing limestone, and nearly a third of all employees engaged in crushing or dressing the rock or in other related work outside the pits are employed at limestone quarries. Thus, limestone quarries form the chief branch of the quarrying industry, even excluding those quarries that produce limestone for use in the manufacture of cement.

The number of men employed in 1930 was about 5 per cent less than in the preceding year, and the number of man-days of employment declined about 11 per cent. The average worker was employed 242 days, as compared with 257 days during 1929.

Accidents resulted in 49 deaths and 3,946 injuries of 1 or more days of disability, the accident-frequency rates per thousand employees being 1.77 for fatalities, as compared with 1.87 in the previous year, and 143 for nonfatal injuries, as compared with 171 in 1929.

Falls or slides of rock or overburden caused 12 fatalities, or one-fourth of the total number that occurred during the year, and explosives were charged with 11 deaths. Nonfatal injuries were due chiefly to handling materials, 967 out of 3,946 injuries in and out of the quarries being so classified. Other leading classes of injuries were those due to flying objects, haulage, and falls or slides of rock or overburden.

The 3,946 injuries included 8 permanent total disabilities, 139 permanent partial disabilities, and 3,799 temporary injuries that disabled the employee for more than the remainder of the day of the accident. It is estimated that these injuries, together with the 49 fatal accidents during the year, represent a loss of time, or period of disability, equal to 491,190 man-days, or 5.9 man-days for each hundred man-shifts worked in the limestone industry during the year, as compared with 5.7 days lost from accidents for each hundred man-shifts worked in the preceding year.

The 10-hour day was the established workday for 40 per cent of the limestone quarrymen in 1930, the 8-hour day for 24 per cent, and the 9-hour day for 20 per cent. The 10-hour day was also the standard for 29 per cent of the employees outside the quarries, while 17 per cent of the men worked 8 hours and 15 per cent worked 9 hours.

QUARRY ACCIDENTS IN THE UNITED STATES, 1930

TABLE 9.—Limestone quarries: Men employed, number killed and injured, and days worked, by States, during the year ended December 31, 1930

State	In and about quarry					In outside works					Total					Wid- ows	Or- phan s	
	Men em- ployed	Days of labor per- formed	Aver- age days active	Killed	In- jured	Men em- ployed	Days of labor per- formed	Aver- age days active	Killed	In- jured	Men em- ployed	Days of labor per- formed	Aver- age days active	Killed	In- jured			
Alabama.....	661	137,199	208	1	96	599	170,505	285	---	55	13	1,260	307,704	244	1	151	---	---
Arkansas.....	143	39,647	277	1	18	68	20,427	300	---	5	5	211	60,074	285	23	23	---	---
California.....	228	56,898	250	1	44	293	94,202	322	---	23	26	521	151,100	290	1	67	1	---
Colorado.....	191	30,488	160	---	32	10	2,145	215	---	4	6	201	32,633	162	36	19	---	---
Georgia.....	128	32,230	232	---	10	38	14,782	235	---	10	3	186	47,022	253	5	19	---	---
Illinois.....	1,794	421,945	243	4	153	557	130,020	233	1	38	2,291	551,565	241	5	211	2	6	---
Indiana.....	2,066	476,574	232	5	242	2,079	551,235	265	2	131	36	4,135	1,027,809	249	7	373	7	21
Iowa.....	380	81,242	214	5	77	94	20,819	221	---	7	17	474	102,061	215	5	84	4	15
Kansas.....	334	68,604	205	---	53	51	9,589	188	---	25	13	385	78,193	203	78	---	---	---
Kentucky.....	654	135,843	208	4	83	243	53,243	219	---	9	20	897	189,086	211	4	92	3	4
Maine.....	180	39,370	304	1	23	249	90,861	305	---	28	3	379	130,431	344	1	51	1	6
Maryland.....	192	47,866	249	1	39	92	22,537	245	---	18	15	284	70,403	248	1	57	1	2
Massachusetts.....	147	31,750	216	---	32	208	56,645	272	---	28	6	355	88,395	249	60	---	---	---
Michigan.....	833	217,286	261	---	61	502	127,939	255	---	54	13	1,335	345,225	259	115	---	---	---
Minnesota.....	131	23,942	183	---	24	109	25,701	236	---	26	2	240	49,643	207	50	---	---	---
Missouri.....	1,626	364,845	224	1	259	765	227,089	297	---	99	41	2,391	691,944	248	1	368	1	---
Montana.....	39	9,679	248	---	4	11	2,517	229	---	---	5	50	12,196	244	4	---	---	---
Nebraska.....	84	22,637	269	---	6	137	55,465	263	---	---	4	241	78,102	324	6	---	---	---
New Jersey.....	121	34,689	287	1	41	16	3,031	189	---	---	4	137	720	275	1	41	1	8
New York.....	1,596	357,143	224	---	194	655	137,548	210	---	111	39	2,251	494,691	220	305	---	---	---
Ohio.....	1,901	440,874	232	2	182	1,386	338,674	259	2	151	57	3,287	799,548	243	4	333	2	3
Oklahoma.....	288	71,603	249	---	51	67	15,979	238	---	2	7	35	87,582	247	53	---	---	---
Pennsylvania.....	3,739	847,008	227	7	460	2,513	600,347	263	1	230	128	6,252	1,507,555	241	8	680	6	14
Tennessee.....	448	98,522	209	3	76	162	45,176	279	1	5	15	610	138,698	227	4	81	3	9
Texas.....	444	100,614	227	3	50	354	99,603	281	49	49	9	798	200,217	251	99	---	---	---
Utah.....	276	48,456	176	---	23	42	11,634	264	---	6	9	320	60,090	188	3	20	---	---
Vermont.....	66	15,759	239	---	8	44	12,407	295	5	5	7	108	28,166	261	13	---	---	---
Virginia.....	683	177,195	259	1	78	406	112,961	278	1	43	29	1,089	290,156	266	2	121	1	5
Washington.....	110	39,275	275	---	16	133	28,703	188	---	8	8	223	47,978	215	21	---	---	---
West Virginia.....	1,115	239,729	215	---	66	351	95,423	272	---	5	13	1,466	335,152	229	74	---	---	---
Wisconsin.....	430	92,060	214	1	102	200	44,840	224	---	44	29	630	136,900	217	1	146	---	---
Wyoming.....	116	25,700	222	---	28	---	---	---	---	---	4	116	25,700	222	28	---	---	---
Not segregated.....	335	80,190	239	---	39	380	106,889	281	---	48	23	715	187,079	262	87	---	---	---
Total, 1930.....	21,319	4,881,662	229	41	2,659	12,874	3,409,156	265	8	1,287	656	34,193	8,290,818	242	49	3,946	33	94

SANDSTONE AND BLUESTONE QUARRIES

The accident rate for quarries producing sandstone and bluestone was again lowered in 1930. Although the fatality rate was higher than in 1929, because there were 7 fatalities as compared with only 1 in the preceding year, the nonfatal injury rate per thousand employees was reduced from 135 to 122, thus effecting a material reduction in the combined rate for both classes of accidents.

Company reports showed that 3,545 men were employed during the year and that they worked 752,974 man-days, an average of 212 days per employee, representing a gain of 8 workdays per employee.

Accidents due to handling materials and those caused by flying objects formed the principal classes of nonfatal injuries to employees inside the quarries, while the main causes of injuries to men working at the outside plants were flying objects and falling objects.

Of the 305 nonfatal injuries during the year 27 caused permanent partial disability to the injured employees, and 278 caused temporary disability for more than the remainder of the day or shift on which the accident occurred. These injuries and the 7 fatal accidents that occurred during the year represented a loss of time or period of disability estimated at 66,380 man-days, or 8.8 days for each hundred man-shifts of work done by all employees at the quarries. Corresponding records for the previous year showed a loss of 2.8 days for each hundred man-shifts worked.

Thirty-five per cent of the men employed inside the quarries in 1930 worked at 9-hour plants, 32 per cent at 10-hour plants, and 19 per cent at 8-hour plants. For operations outside the quarries, the 9-hour day was the standard for 45 per cent of the employees, the 10-hour day for 23 per cent, and the 8-hour day for 18 per cent.

TABLE 10.—Sandstone and bluestone quarries: Men employed, number killed and injured, and days worked, by States, during the year ended December 31, 1930

State	In and about quarry					In outside works					Total					Wid- ows	Or- phans	
	Men em- ployed	Days of labor per- formed	Aver- age days active	Killed	In- jured	Men em- ployed	Days of labor per- formed	Aver- age days active	Killed	In- jured	Active oper- ators	Men em- ployed	Days of labor per- formed	Aver- age days active	Killed			In- jured
Arkansas.....	165	23,134	140	—	3	19	2,600	137	—	1	5	184	25,734	140	—	4	—	
California.....	76	7,740	102	—	16	23	2,780	121	—	8	10	99	10,520	106	—	24	—	
Kentucky.....	32	3,827	120	—	4	25	3,611	144	—	1	4	57	7,438	130	—	5	—	
New York.....	219	33,096	151	1	18	50	12,528	251	—	4	22	269	45,624	170	1	22	—	
Ohio.....	676	176,358	231	2	44	624	173,965	279	1	45	13	1,300	350,323	269	3	89	3	
Pennsylvania.....	755	143,231	198	2	97	307	60,515	197	—	15	38	1,062	209,746	198	2	112	1	
West Virginia.....	68	14,108	207	1	8	15	3,675	245	—	—	5	83	17,783	214	1	8	—	
Wisconsin.....	102	23,176	227	—	10	19	3,029	159	—	4	9	121	26,205	217	—	14	—	
Not segregated.....	284	44,277	156	—	22	86	15,324	178	—	5	25	370	59,601	161	—	27	—	
Total, 1930.....	2,377	474,947	200	6	222	1,168	278,027	238	1	83	131	3,545	752,974	212	7	305	4	9

TABLE 11.—All quarries: Fatalities and injuries, by causes and kinds of quarries, during the year ended December 31, 1930

	In and about quarry													In outside works													Total		
	Falls or slides of rock or overburden	Handling materials	Timber or hand tools	Explosives	Haulage	Falls of persons	Falling objects (other than 1 and 2)	Flying objects	Electricity	Drilling and channelling (by machine or hand)	Machinery	Nails, splinters, etc.	Boiler and air-tank explo-	Burns	Other causes	Total	Haulage	Machinery	Hand tools	Nails, splinters, etc.	Electricity	Falls of persons	Falling objects (rocks, tim-bers, etc.)	Flying objects	Handling materials	Burns		Other causes	Total
Killed:	1	3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	28		
Cement rock.....									1							4	1	4			2	4	1			1			13
Granite.....	4	1	1			1	1	1								8	2	4								1			4
Limestone.....	12	3	11	2		2	4	2		1	3				1	41	1	3				1	2	1				8	
Marble.....																6												2	
Sandstone and bluestone.....	2					1	2			1						6						1						1	
Slate.....																10		3										3	
Trap rock.....	5				2	2										10												1	
Total.....	24	5	14	6	4	7	3	1	1	8					1	74	4	10			3	5	1	1	1	1	1	31	105
Injured:	46	75	19	10	37	18	8	13	2	42	6	13			9	300	21	46	20	14	12	47	34	42	44	46	52	378	678
Granite.....	40	169	23	15	20	61	40	106		40	64	7			81	672	18	49	25	5	5	37	39	223	71	8	44	519	1,191
Limestone.....	252	800	63	91	297	151	111	303	14	103	164	58			33	2,650	112	193	71	47	16	158	114	114	167	85	210	1,287	3,946
Marble.....	10	17	12	1	5	25	19	38	2	27	24	4			4	231	22	37	11	12		32	27	40	83	4	13	281	512
Sandstone and bluestone.....	20	56	2	2	17	13	8	28		5	18	1			8	232	15	14	6			7	15	17	14	10	83	305	
Slate.....	20	86	3	2	8	13	12	18	4	10	3				23	202	5	10				13	4	19	42	23	121	323	
Trap rock.....	31	105	9	10	21	20	18	43	3	23	40	9			5	366	15	16	6	4	3	20	6	6	14	4	2	96	462
Total.....	419	1,308	131	131	405	301	216	554	21	244	326	95			51	450	193	360	149	82	31	314	239	461	435	147	354	2,765	7,417

TABLE 12.—All quarries: Number of active operators reporting during the years ended December 31, 1930 and 1929

State	Cement rock ¹	Granite	Lime- stone	Marble	Sand- stone and blue- stone	Slate	Trap rock	Total, 1930	Total, 1929
Alabama.....	4		13	3	2			22	24
Arizona.....		1	3					4	2
Arkansas.....			5	2	5			12	10
California.....	8	27	26	5	10	2	27	105	105
Colorado.....	1	5	6	2	4			18	12
Connecticut.....		9	4	1	1		6	21	20
Georgia.....	3	14	3	2		1		23	22
Idaho.....	1		3		1			5	7
Illinois.....	5		35		3			43	48
Indiana.....	3		36		1			40	43
Iowa.....	4		17					21	21
Kansas.....	7		13					20	21
Kentucky.....			20		4			25	27
Maine.....	1	19	3			2		25	27
Maryland.....	2	3	15	2	1	1	7	31	29
Massachusetts.....		27	6	4	1		15	53	56
Michigan.....	3		13		1	1		19	19
Minnesota.....	2	20	8		2		1	33	31
Missouri.....	3	1	41	2				47	49
Montana.....	1	2	5					8	9
Nebraska.....	1		4				1	6	5
New Hampshire.....		16						16	19
New Jersey.....	2		4			2	24	32	33
New Mexico.....			3		2			5	3
New York.....	7	2	39	3	22	4	4	81	92
North Carolina.....		8	1	1				10	12
Ohio.....	5		57		13			75	79
Oklahoma.....	2	1	7					10	11
Oregon.....	2	4	2				1	9	10
Pennsylvania.....	16	10	128		38	29	15	236	253
Rhode Island.....		6	1				1	8	8
South Dakota.....		5	3		1			9	11
Tennessee.....	4		15	9				28	25
Texas.....	6	5	15				1	27	28
Utah.....	1	1	9	1				12	15
Vermont.....		18	7	3	1	17		46	49
Virginia.....	2	4	29		3	3	2	43	40
Washington.....	2	7	8	1	1		5	24	18
West Virginia.....			13		5			18	20
Wisconsin.....	1	12	29		9		1	52	55
Wyoming.....			4					4	4
Not segregated.....	2	4	3					9	10
Total, 1930.....	102	231	656	41	131	62	112	1,335	1,382

¹ Includes quarries producing limestone for manufacture of cement.

TABLE 13.—All quarries: Men employed and equivalent in 300-day workers, by States, during the years ended December 31, 1930 and 1929

State	Men employed				Equivalent in 300-day workers			
	In and about quarry	In out-side works	Total, 1930	Total, 1929	In and about quarry	In out-side works	Total, 1930	Total, 1929
Alabama.....	925	1, 237	2, 162	2, 293	692	1, 237	1, 929	2, 254
Arkansas.....	336	87	423	400	232	77	309	297
California.....	1, 577	2, 375	3, 952	4, 366	1, 278	2, 328	3, 606	4, 096
Colorado.....	308	325	633	511	185	266	451	430
Connecticut.....	444	223	667	726	387	207	594	648
Georgia.....	904	1, 584	2, 488	2, 654	742	1, 489	2, 231	2, 478
Illinois.....	2, 013	1, 710	3, 723	4, 381	1, 660	1, 679	3, 339	4, 012
Indiana.....	2, 216	2, 880	5, 096	5, 407	1, 687	2, 551	4, 238	4, 782
Iowa.....	586	1, 032	1, 618	1, 459	478	1, 133	1, 611	1, 378
Kansas.....	523	811	1, 334	1, 438	404	792	1, 196	1, 297
Kentucky.....	736	518	1, 254	1, 398	516	493	1, 009	1, 106
Maine.....	906	834	1, 740	1, 905	697	789	1, 486	1, 618
Maryland.....	563	587	1, 150	1, 067	432	496	928	958
Massachusetts.....	1, 021	1, 047	2, 068	2, 557	741	874	1, 615	2, 213
Michigan.....	933	1, 317	2, 250	2, 362	808	1, 337	2, 145	2, 346
Minnesota.....	587	856	1, 443	1, 564	445	772	1, 217	1, 389
Missouri.....	1, 846	1, 236	3, 082	3, 213	1, 394	1, 196	2, 590	2, 774
New Hampshire.....	260	405	665	536	206	356	562	422
New Jersey.....	821	887	1, 708	1, 730	603	735	1, 338	1, 469
New Mexico.....	84	17	101	91	33	7	40	67
New York.....	2, 221	2, 210	4, 431	4, 322	1, 617	2, 046	3, 663	3, 531
North Carolina.....	720	563	1, 283	1, 571	467	474	941	1, 206
Ohio.....	2, 748	2, 737	5, 485	5, 978	2, 185	2, 527	4, 712	5, 291
Oklahoma.....	424	577	1, 001	1, 009	377	652	1, 029	1, 039
Pennsylvania.....	6, 482	7, 265	13, 747	14, 478	4, 833	6, 009	11, 442	13, 116
Rhode Island.....	77	76	153	165	66	75	141	140
Tennessee.....	1, 640	1, 309	2, 949	3, 308	1, 230	1, 136	2, 366	2, 936
Texas.....	669	1, 330	1, 999	1, 848	518	1, 251	1, 769	1, 857
Utah.....	301	110	411	484	181	93	274	389
Vermont.....	1, 846	2, 019	3, 865	4, 148	1, 677	1, 883	3, 560	3, 980
Virginia.....	1, 127	758	1, 885	1, 964	875	668	1, 543	1, 798
Washington.....	256	463	719	655	205	400	605	594
West Virginia.....	1, 221	457	1, 678	1, 707	860	385	1, 245	1, 529
Wisconsin.....	885	643	1, 528	1, 922	658	517	1, 175	1, 575
Not segregated.....	867	1, 075	1, 942	1, 944	632	1, 000	1, 632	1, 544
Total, 1930.....	39, 073	41, 560	80, 633	85, 561	30, 001	38, 530	68, 531	76, 559

TABLE 14.—All quarries: Days of labor performed and average number of days quarries were operated, by States, during the years ended December 31, 1930 and 1929

State	Days of labor performed				Average days active			
	In and about quarry	In outside works	Total, 1930	Total, 1929	In and about quarry	In outside works	Total, 1930	Total, 1929
Alabama.....	207,716	370,958	578,674	676,334	225	300.	268	295
Arkansas.....	69,607	23,027	92,634	89,094	207	265	219	223
California.....	383,437	698,345	1,081,782	1,228,939	243	294	274	281
Colorado.....	55,408	79,799	135,207	128,892	180	246	214	252
Connecticut.....	116,210	61,953	178,163	194,471	262	278	268	268
Georgia.....	222,662	446,536	669,198	743,289	246	282	269	280
Illinois.....	497,982	503,816	1,001,798	1,203,428	247	295	269	275
Indiana.....	506,024	765,467	1,271,491	1,434,513	228	266	250	265
Iowa.....	143,518	339,824	483,342	413,398	245	329	299	283
Kansas.....	121,091	237,578	358,669	389,125	232	293	269	271
Kentucky.....	154,670	148,104	302,774	331,876	210	286	241	237
Maine.....	209,037	236,899	445,936	485,337	231	284	256	255
Maryland.....	129,749	148,732	278,481	287,435	230	253	242	269
Massachusetts.....	222,200	262,418	484,618	663,963	218	251	234	260
Michigan.....	242,377	401,134	643,511	703,716	260	305	286	298
Minnesota.....	133,593	231,509	365,102	416,567	228	270	253	266
Missouri.....	418,089	358,804	776,893	832,126	226	290	252	259
New Hampshire.....	61,902	106,682	168,584	126,638	238	263	254	236
New Jersey.....	180,890	220,534	401,424	440,713	220	249	235.	255
New Mexico.....	9,906	2,050	11,956	20,210	118	121	118	222
New York.....	485,154	613,606	1,098,760	1,059,170	218	278	248	245
North Carolina.....	139,958	142,190	282,148	361,733	194	253	220	230
Ohio.....	655,590	758,050	1,413,640	1,587,149	239	277	258	265
Oklahoma.....	113,018	195,694	308,712	311,779	267	339	308	309
Pennsylvania.....	1,449,869	1,982,870	3,432,739	3,934,929	224	273	250	272
Rhode Island.....	19,739	22,548	42,287	42,036	256	297	276	255
Tennessee.....	368,934	340,774	709,708	880,778	225	260	241	266
Texas.....	155,532	375,180	530,712	557,172	232	282	265	302
Utah.....	54,301	27,804	82,105	116,703	180	253	200	241
Vermont.....	502,955	565,096	1,068,051	1,194,087	272	280	276	288
Virginia.....	262,520	200,255	462,775	539,473	233	264	246	275
Washington.....	61,696	119,940	181,636	178,310	241	259	253	272
West Virginia.....	257,979	115,529	373,508	458,702	211	253	223	269
Wisconsin.....	197,477	155,158	352,635	472,360	223	241	231	246
Not segregated.....	189,660	300,059	489,719	463,134	219	279	252	238
Total, 1930.....	9,000,450	11,558,922	20,559,372	22,967,579	230	278	255	268

TABLE 15.—All quarries: Number of fatalities and injuries, by States, during the years ended December 31, 1930 and 1929

State	Number killed				Number injured			
	In and about quarry	In out-side works	Total, 1930	Total, 1929	In and about quarry	In out-side works	Total, 1930	Total, 1929
Alabama.....	1		1	2	113	83	196	376
Arkansas.....				1	21	6	27	19
California.....	6	2	8	8	418	166	584	644
Colorado.....					36	26	62	81
Connecticut.....	1	1	2	1	37	39	76	164
Georgia.....	1		1	9	51	93	144	306
Illinois.....	5	3	8	11	163	60	223	456
Indiana.....	5	2	7	2	244	133	377	472
Iowa.....	5	3	8	3	105	77	182	206
Kansas.....		2	2	2	61	31	92	115
Kentucky.....	4	1	5	2	91	20	111	159
Maine.....	1	1	2		102	58	160	208
Maryland.....	2	1	3	2	98	32	130	130
Massachusetts.....	4	2	6	3	204	207	411	458
Michigan.....			0	1	71	54	125	185
Minnesota.....		1	1		120	84	204	287
Missouri.....	1		1	3	280	153	433	604
New Hampshire.....			0		30	66	96	76
New Jersey.....	4		4	9	103	17	120	233
New Mexico.....			0		3		3	11
New York.....	3	1	4	14	262	163	425	458
North Carolina.....				2	40	55	95	135
Ohio.....	4	3	7	6	227	200	427	673
Oklahoma.....			0		53	37	90	152
Pennsylvania.....	10	3	13	20	711	359	1,070	1,227
Rhode Island.....			0		6	5	11	21
Tennessee.....	5	1	6	6	179	51	230	345
Texas.....			0	2	69	81	150	210
Utah.....	3		3	1	26	10	36	59
Vermont.....	3	2	5	3	220	160	380	398
Virginia.....	2	1	3	2	134	60	194	194
Washington.....			0	3	30	11	41	57
West Virginia.....	1		1	2	74	8	82	114
Wisconsin.....	2		2	1	147	71	218	330
Not segregated.....	1	1	2	5	123	89	212	247
Total, 1930.....	74	31	105	126	4,652	2,765	7,417	9,810

TABLE 16.—All quarries: Fatality rates and injury rates, by States, during the years ended December 31, 1930 and 1929¹

State	Killed per thousand 300-day workers				Injured per thousand 300-day workers			
	In and about quarry	In outside works	Total, 1930	Total, 1929	In and about quarry	In outside works	Total, 1930	Total, 1929
Alabama.....	1.45		0.52	0.89	163.29	67.10	101.61	166.81
Arkansas.....				3.37	90.52	77.92	87.38	63.97
California.....	4.69	0.86	2.22	1.95	327.07	71.31	161.95	157.23
Colorado.....					194.59	97.74	137.47	188.37
Connecticut.....	2.58	4.83	3.37	1.54	95.61	188.41	127.95	253.09
Georgia.....	1.35		.45	3.63	68.73	62.46	64.55	123.49
Illinois.....	3.01	1.79	2.40	2.74	98.19	35.74	66.79	113.66
Indiana.....	2.96	.78	1.65	.42	144.64	52.14	88.96	98.70
Iowa.....	10.46	2.65	4.97	2.18	219.67	67.96	112.97	149.49
Kansas.....		2.53	1.67	1.54	150.99	39.14	76.92	88.67
Kentucky.....	7.75	2.03	4.96	1.81	176.36	40.57	110.01	143.76
Maine.....	1.43	1.27	1.35		146.34	73.51	107.67	128.55
Maryland.....	4.63	2.02	3.23	2.09	226.85	64.52	140.09	135.70
Massachusetts.....	5.40	2.29	3.72	1.36	275.30	236.84	254.49	206.96
Michigan.....				.43	87.87	40.39	58.28	78.86
Minnesota.....		1.30	.82		269.66	108.81	167.63	206.62
Missouri.....	.72		.39	1.08	200.86	127.93	167.18	217.74
New Hampshire.....					145.63	185.39	170.82	180.09
New Jersey.....	6.63		2.99	6.13	170.81	23.13	89.69	158.61
New Mexico.....								
New York.....	1.86	.49	1.09	3.96	162.03	79.67	116.03	129.71
North Carolina.....				1.66	85.65	116.03	100.96	111.94
Ohio.....	1.83	1.19	1.49	1.13	103.89	79.15	90.62	127.20
Oklahoma.....					140.58	56.75	87.46	146.29
Pennsylvania.....	2.07	.45	1.14	1.52	147.11	54.32	93.52	93.55
Rhode Island.....					90.91	66.67	78.01	150.00
Tennessee.....	4.07	.88	2.54	2.04	145.53	44.89	97.21	117.51
Texas.....				1.08	133.20	64.75	84.79	113.09
Utah.....	16.57		10.95	2.67	143.65	107.53	131.39	151.67
Vermont.....	1.79	1.06	1.40	.75	131.19	84.97	106.74	100.00
Virginia.....	2.29	1.50	1.94	1.11	153.14	89.82	125.73	107.90
Washington.....				5.05	146.34	27.50	67.77	95.96
West Virginia.....	1.16		.80	1.31	86.05	20.78	65.86	74.56
Wisconsin.....	3.04		1.70	.63	223.40	137.33	185.53	209.52
Not segregated.....	1.58	1.00	1.23	3.24	194.62	89.00	129.90	159.97
Total, 1930.....	2.47	.80	1.53	1.65	155.06	71.76	108.23	128.14

¹ Rates not shown where number of 300-day workers employed was less than 50.

TABLE 17.—All quarries: Comparison of accident rates, 1930 with 1929

State	Fatal and non-fatal accidents per thousand 300-day workers		Change in 1930, per cent		State	Fatal and non-fatal accidents per thousand 300-day workers		Change in 1930, per cent	
	1929	1930	Increase	Decrease		1929	1930	Increase	Decrease
Alabama.....	167.70	102.13	-----	39.1	North Carolina....	113.60	100.96	-----	11.1
Arkansas.....	67.34	87.38	29.8	-----	Ohio.....	128.33	92.11	-----	28.2
California.....	159.18	164.17	3.1	-----	Oklahoma.....	146.29	87.46	-----	40.2
Colorado.....	188.37	137.47	-----	27.0	Pennsylvania.....	95.07	94.66	-----	.4
Connecticut.....	254.63	131.32	-----	48.4	Rhode Island.....	150.00	78.01	-----	48.0
Georgia.....	127.12	65.00	-----	48.9	Tennessee.....	119.55	99.75	-----	16.6
Illinois.....	116.40	69.19	-----	40.6	Texas.....	114.17	84.79	-----	25.7
Indiana.....	99.12	90.61	-----	8.6	Utah.....	154.24	142.34	-----	7.7
Iowa.....	151.67	117.94	-----	22.2	Vermont.....	100.75	108.14	-----	7.3
Kansas.....	90.21	78.59	-----	12.9	Virginia.....	109.01	127.67	-----	17.1
Kentucky.....	145.57	114.97	-----	21.0	Washington.....	101.01	67.77	-----	32.9
Maine.....	128.55	109.02	-----	15.2	West Virginia.....	75.87	66.66	-----	12.1
Maryland.....	137.79	143.32	4.0	-----	Wisconsin.....	210.15	187.23	-----	10.9
Massachusetts.....	208.32	258.21	23.9	-----	Not segregated.....	163.21	131.13	-----	19.7
Michigan.....	79.29	58.28	-----	26.5	Total.....	129.79	109.76	-----	15.4
Minnesota.....	206.62	168.45	-----	18.5					
Missouri.....	218.82	167.57	-----	23.4					
New Hampshire.....	180.09	170.82	-----	5.1					
New Jersey.....	164.74	92.68	-----	43.7					
New York.....	133.67	117.12	-----	12.4					

QUARRY ACCIDENTS IN THE UNITED STATES, 1930

TABLE 19.—All quarries: Injuries, by causes and States, during the year ended December 31, 1930

State	In and about quarry													In outside works										Grand total					
	Falls or slides of rock or overburden	Handling materials	Timber or hand tools	Explosives	Haulage	Falls of persons	Falling objects (other than 1 and 2)	Flying objects	Electricity	Drilling and channelling (by machine or hand)	Machinery	Nails, splinters, etc.	Boiler and air-tank explosions	Burns	Other causes	Total	Haulage	Machinery	Hand tools	Nails, splinters, etc.	Electricity	Falls of persons	Falling objects (rocks, timbers, etc.)		Flying objects	Handling materials	Burns	Other causes	Total
Alabama.....	17	45	1	2	5	4	2	13	---	10	4	6	---	1	3	113	6	18	4	3	1	8	3	7	23	4	6	83	196
Arkansas.....	1	10	1	---	4	1	---	4	---	---	---	---	---	---	---	21	2	6	---	---	---	---	---	---	---	---	---	6	27
California.....	71	95	19	13	32	42	6	30	---	51	27	15	---	4	13	418	13	16	17	5	5	26	14	29	24	12	5	166	584
Colorado.....	5	18	---	1	3	---	3	3	---	1	---	2	---	---	---	36	---	8	1	1	---	6	7	---	---	---	2	62	
Connecticut.....	---	14	3	1	2	3	1	2	---	4	4	2	---	---	---	37	3	8	2	3	---	6	1	4	---	---	3	76	
Georgia.....	4	15	4	1	6	2	3	2	---	4	8	---	---	1	1	51	6	17	2	6	---	7	11	20	1	5	93	144	
Illinois.....	7	43	4	8	33	9	4	15	---	6	14	10	---	1	9	163	7	8	3	3	4	1	6	6	9	7	6	60	223
Indiana.....	6	57	5	2	7	19	19	24	---	16	16	2	---	1	70	244	12	12	1	6	---	22	14	9	25	1	42	133	377
Iowa.....	3	22	4	3	12	4	5	14	---	1	4	8	14	---	1	105	2	2	7	2	1	8	12	8	9	14	12	77	182
Kansas.....	3	15	---	3	12	1	---	8	---	2	6	5	---	2	2	61	5	8	4	---	4	---	4	4	2	---	1	31	92
Kentucky.....	12	23	1	11	14	5	3	9	---	1	10	2	---	2	2	91	1	2	5	2	1	5	---	13	15	9	7	20	111
Maine.....	10	46	3	2	3	7	3	9	---	5	8	2	---	---	4	102	6	6	---	---	---	---	2	18	15	8	8	58	160
Maryland.....	9	39	---	2	3	7	6	12	---	1	3	2	---	2	7	98	4	4	1	---	---	1	7	8	---	6	32	130	
Massachusetts.....	18	66	1	3	8	11	11	36	---	12	7	3	---	---	27	204	13	16	4	3	---	24	9	80	28	8	22	207	411
Michigan.....	7	7	4	1	7	9	7	8	---	2	5	13	---	---	71	9	6	3	---	---	---	10	5	1	12	---	8	54	125
Minnesota.....	8	32	1	4	3	5	6	41	---	1	4	1	---	---	11	120	15	6	2	---	5	16	20	16	---	4	84	204	
Missouri.....	34	77	3	9	13	23	25	39	---	6	20	4	---	5	22	280	4	9	10	4	2	15	15	34	35	8	17	153	433
New Hampshire.....	1	12	2	1	1	3	---	4	---	2	3	---	---	---	3	30	1	3	3	---	5	2	26	10	---	16	66	96	
New Jersey.....	10	32	7	5	6	4	1	7	---	5	10	3	---	1	8	103	5	1	1	1	1	3	1	---	3	2	17	120	
New Mexico.....	1	---	---	---	---	---	1	---	---	---	---	---	---	---	---	3	16	28	9	6	1	18	16	27	17	6	19	163	3
New York.....	18	54	7	4	18	13	18	30	---	3	21	25	---	4	44	262	16	28	9	6	1	18	16	27	17	6	19	425	

QUARRY ACCIDENTS IN THE UNITED STATES, 1930

North Carolina.....	3	7	1	5	2	5	2	1	7	1	4	40	5	4	2	---	1	5	30	4	1	3	55	95				
Ohio.....	20	23	9	1	36	21	7	16	6	17	8	227	16	34	11	5	2	31	20	24	14	23	200	427				
Oklahoma.....	7	2	2	4	11	1	3	12	1	---	---	53	---	3	3	2	2	3	3	3	3	11	37	90				
Pennsylvania.....	50	273	6	11	87	38	27	96	---	14	35	3	68	711	27	55	19	11	3	58	19	34	369	1,070				
Rhode Island.....	---	3	---	---	---	---	---	---	---	---	---	6	---	4	---	---	---	---	1	---	---	---	5	11				
Tennessee.....	11	43	6	13	14	9	2	25	---	12	7	2	3	32	179	12	6	---	3	4	5	10	6	230				
Texas.....	6	15	4	1	14	8	5	9	---	2	2	1	69	11	7	10	5	2	4	8	10	13	4	160				
Utah.....	7	4	1	2	3	3	2	2	---	3	---	26	2	2	4	1	---	---	1	---	---	---	10	36				
Vermont.....	11	28	13	3	4	27	22	33	---	14	26	2	3	34	220	8	17	10	5	23	15	27	160	380				
Virginia.....	17	69	2	13	9	3	3	10	---	4	4	1	8	134	2	8	2	2	---	3	11	6	60	194				
Washington.....	2	10	---	---	2	---	---	---	---	1	1	1	2	4	30	1	---	---	---	---	---	---	11	41				
West Virginia.....	24	11	1	4	13	5	3	7	---	2	1	1	1	74	1	2	---	---	3	1	---	---	8	82				
Wisconsin.....	7	73	6	2	6	8	4	18	---	3	8	2	8	147	7	11	3	---	3	8	5	9	71	218				
Not segregated.....	9	35	10	1	8	6	11	5	1	16	11	1	9	123	10	12	3	3	12	2	15	5	89	212				
Total, 1930.....	419	1,308	131	131	405	301	216	554	21	244	328	95	51	450	4,657	193	360	149	82	31	314	239	461	435	147	384	2,765	7,417

ACCIDENTS BY PRINCIPAL CAUSES

The relative importance of the leading causes of quarry accidents does not change greatly from year to year, although the frequency rate for accidents from any given cause may, standing alone, vary over a period of years. For the industry as a whole, the main causes of fatal accidents in 1930 were, as usual, falls or slides of rock or overburden and explosives. Nonfatal injuries, on the other hand, were due chiefly to handling materials; other important types of accidents causing nonfatal injuries were those due to flying objects, falls or slides of rock, haulage, machinery, and falls of persons.

Table 20 compares the percentage of accidents from various causes in the quarries and at outside works for all classes of quarries combined. The table shows the percentage of fatalities, by causes, for the entire industry, the percentage of accidents inside the quarries, and the percentage of accidents outside the quarries. The percentages of accidents inside and outside the quarries, separately, show more nearly the true hazard of each branch of the industry than those based on the industry as a unit. The annual fluctuation in quarry hazards is indicated even more accurately in Table 21, which shows the number of accidents for each class of quarries from any given cause, based on 1,000 full-time or 300-day workers. By this method of presentation the injury rate from any given cause may be followed from year to year, uninfluenced by the increase or decrease in other classes of accidents.

Particular attention is called to Tables 30, 31, and 32. The first two classify the accidents according to the degree of disability of the injured person, and Table 32 further segregates the different classes of accidents by the kind of quarry in which they occurred.

TABLE 20.—All quarries: Causes of fatalities and injuries, showing percentage due to each cause and corresponding rates per thousand 300-day workers employed during the year ended December 31, 1930

Cause of accident	Number killed				Number injured			
	Per cent of—		Per thousand 300-day workers		Per cent of—		Per thousand 300-day workers	
	Grand total	Class total	Grand total	Class total	Grand total	Class total	Grand total	Class total
	1	2	3	4	5	6	7	8
In and about quarry:								
1. Falls or slides of rock or overburden.....	22.86	32.43	0.35	0.80	5.65	9.01	6.11	13.96
2. Handling material.....	4.76	6.76	.07	.17	17.63	28.12	19.09	43.60
3. Timber or hand tools.....					1.77	2.82	1.91	4.37
4. Explosives.....	13.33	18.92	.20	.47	1.77	2.82	1.91	4.37
5. Haulage.....	5.72	8.11	.09	.20	5.46	8.70	5.91	13.50
6. Falls of persons.....	3.81	5.41	.05	.13	4.06	6.47	4.39	10.03
7. Falling objects (other than 1 and 2).....	6.67	9.46	.10	.23	2.91	4.64	3.15	7.20
8. Flying objects.....	2.86	4.05	.04	.10	7.47	11.91	8.08	18.46
9. Electricity.....	.95	1.35	.02	.03	.28	.45	.31	.70
10. Drilling and channeling (by machine or hand).....	.95	1.35	.02	.03	3.29	5.24	3.56	8.13
11. Machinery.....	7.62	10.81	.12	.27	4.39	7.01	4.76	10.87
12. Nails, splinters, etc.....					1.28	2.04	1.39	3.17
13. Boiler and air-tank explosions.....								
14. Burns.....					.69	1.10	.74	1.70
15. Other causes.....	.95	1.35	.02	.03	6.07	9.67	6.57	15.00
Total.....	70.48	100.00	1.08	2.47	62.72	100.00	67.88	155.06
In outside works:								
16. Haulage.....	3.81	12.90	.05	.10	2.60	6.98	2.82	5.01
17. Machinery.....	9.53	32.25	.14	.25	4.85	13.02	5.25	9.34
18. Hand tools.....					2.01	5.39	2.17	3.87
19. Nails, splinters, etc.....					1.11	2.97	1.20	2.13
20. Electricity.....	2.86	9.67	.04	.07	.42	1.12	.45	.80
21. Falls of persons.....	4.76	16.13	.07	.13	4.23	11.36	4.58	8.15
22. Falling objects (rocks, timbers, etc.).....	4.76	16.13	.07	.13	3.22	8.64	3.49	6.20
23. Flying objects.....	.95	3.23	.02	.03	6.22	16.67	6.73	11.96
24. Handling materials.....	.95	3.23	.02	.03	5.87	15.73	6.35	11.29
25. Burns.....	.95	3.23	.02	.03	1.98	5.32	2.14	3.82
26. Other causes.....	.95	3.23	.02	.03	4.77	12.80	5.17	9.19
Total.....	29.52	100.00	.45	.80	37.28	100.00	40.35	71.76
Grand total.....	100.00		1.53		100.00		108.23	

TABLE 21.—All quarries: Number injured per thousand 300-day workers, by causes, during the year ended December 31, 1930

Cause of accident	Cement rock		Granite		Limestone		Marble	
	1929	1930	1929	1930	1929	1930	1929	1930
In and about quarry:								
1. Falls or slides of rock or overburden.....	15.607	15.028	16.836	9.292	18.806	15.487	6.814	4.895
2. Handling materials.....	14.472	24.502	37.784	39.257	44.412	49.164	22.572	8.321
3. Timber or hand tools.....	3.121	6.207	2.937	5.343	7.162	3.872	8.518	5.874
4. Explosives.....	4.257	3.267	2.937	3.494	4.534	5.592	.426	.489
5. Haulage.....	10.499	12.088	5.873	4.646	23.030	18.252	1.278	2.447
6. Falls of persons.....	5.108	5.880	10.963	14.169	10.150	9.280	8.944	12.237
7. Falling objects (other than 1 and 2).....	2.554	2.614	8.614	9.292	8.965	6.822	12.777	9.300
8. Flying objects.....	5.108	4.247	29.757	24.622	26.483	13.621	20.017	18.600
9. Electricity.....	.284	.653	1.370	.....	.721	.860	.852	.979
10. Drilling and channeling (by machine or hand).....	5.392	13.721	10.376	9.292	7.934	6.330	9.370	13.216
11. Machinery.....	6.243	1.960	12.921	14.866	13.293	10.079	13.628	11.747
12. Nails, splinters, etc.....	1.703	4.247	2.349	1.626	4.225	3.564	.426	1.958
13. Boiler and air-tank explosions.....	.....	.....	.979	.....	.051	.....	.....	.....
14. Burns.....	1.135	.653	.979	1.394	2.731	2.028	1.278	1.958
15. Other causes.....	7.945	2.940	20.164	18.815	17.569	13.459	7.240	21.048
Total.....	83.428	98.007	164.839	156.098	190.066	163.410	114.140	113.069
Number of 300-day workers in and about quarries.....	3,524	3,061	5,108	4,305	19,409	16,272	2,348	2,043
In outside works:								
16. Haulage.....	1.100	1.248	1.692	4.477	13.115	9.856	2.984	6.183
17. Machinery.....	4.234	2.735	16.675	12.189	16.135	16.983	10.445	10.399
18. Hand tools.....	3.244	1.189	10.875	6.219	10.354	6.248	4.228	3.092
19. Nails, splinters, etc.....	.880	.832	1.692	1.244	5.349	4.136	1.402	3.373
20. Electricity.....	.715	.713	.241	.....	1.639	1.408	.995	.....
21. Falls of persons.....	5.444	2.794	6.525	9.204	15.617	13.903	5.471	8.994
22. Falling objects (rock, etc.).....	2.694	2.021	8.216	9.701	15.962	10.032	13.678	7.588
23. Flying objects.....	5.059	2.497	67.182	55.473	16.480	10.032	7.461	11.242
24. Handling materials.....	3.409	2.616	34.558	17.662	19.154	14.695	31.087	23.328
25. Burns.....	4.729	2.735	.725	1.990	7.765	7.480	1.990	1.124
26. Other causes.....	4.234	3.091	14.258	10.945	18.723	18.479	4.974	3.654
Total.....	35.742	22.471	162.639	129.104	140.293	113.252	84.805	78.977
Number of 300-day workers in outside works.....	18,186	16,822	4,138	4,020	11,590	11,364	4,021	3,558
Total injured (rate).....	43.482	34.099	163.855	143,063	171.457	142.785	95.619	91.412
Total 300-day workers.....	21,710	19,883	9,246	8,325	30,999	27,636	6,369	5,601

TABLE 21.—All quarries: Number injured per thousand 300-day workers, by causes, during the year ended December 31, 1930—Continued

Cause of accident	Sandstone and bluestone		Slate		Trap rock		Total	
	1929	1930	1929	1930	1929	1930	1929	1930
In and about quarry:								
1. Falls or slides of rock or overburden.....	9.045	12.634	19.274	17.637	25.161	19.339	17.295	13.966
2. Handling materials.....	44.093	35.376	80.499	75.838	40.180	65.502	40.626	43.599
3. Timber or hand tools.....	2.261	1.263	7.937	2.645	8.030	5.614	6.091	4.366
4. Explosives.....	12.436	1.263	7.937	1.764	5.353	6.238	4.610	4.366
5. Haulage.....	13.002	10.739	9.637	7.055	14.989	13.100	16.345	13.500
6. Falls of persons.....	3.392	8.212	6.802	11.464	15.525	12.477	9.472	10.033
7. Falling objects (other than 1 and 2).....	5.088	5.054	7.937	10.582	14.454	11.229	8.578	7.200
8. Flying objects.....	26.003	17.688	19.274	15.873	39.614	29.944	24.728	18.466
9. Electricity.....					1.606	1.872	.754	.700
10. Drilling and channeling (by machine or hand).....	1.696	3.159	3.401	3.527	13.919	14.348	7.907	8.133
11. Machinery.....	13.567	11.371	9.070	8.818	25.696	24.953	13.020	10.866
12. Nails, splinters, etc.....	1.696	.632		2.646	8.030	5.614	3.325	3.167
13. Boiler and air-tank explosions.....							1.168	
14. Burns.....	2.261	1.895	.567		2.141	1.872	2.068	1.700
15. Other causes.....	23.742	30.954	17.007	20.282	34.797	16.220	17.491	14.999
Total.....	158.282	140.240	189.342	178.131	249.465	228.322	172.478	155.061
Number of 300-day workers in and about quarry.....	1,769	1,583	1,764	1,134	1,868	1,603	35,790	30,001
In outside works:								
16. Haulage.....	1.295		5.709	5.056	7.177	17.647	5.028	5.009
17. Machinery.....	15.544	15.103	13.866	5.056	21.531	18.823	10.351	9.343
18. Hand tools.....	3.886	6.472	4.894	10.111	8.373	7.059	6.304	3.867
19. Nails, splinters, etc.....		.816			4.785	4.706	2.355	2.128
20. Electricity.....	2.591		.816		3.589	3.529	1.055	.805
21. Falls of persons.....	5.181	7.551	9.788	13.145	13.158	23.529	8.732	8.149
22. Falling objects (rock, etc.).....	1.295	16.181	1.631	4.044	13.158	7.059	8.266	6.203
23. Flying objects.....	14.249	18.339	12.235	19.211	28.708	7.059	15.723	11.965
24. Handling materials.....	12.954	15.103	40.783	42.467	32.296	16.471	15.673	11.290
25. Burns.....	1.295		1.631		3.589	4.706	4.734	3.815
26. Other causes.....	23.316	10.787	36.705	23.256	14.354	2.353	10.989	9.188
Total.....	81.606	89.536	128.874	122.346	150.718	112.941	89.210	71.762
Number of 300-day workers in outside works.....	772	927	1,226	989	836	850	40,769	38,530
Total injured (rate).....	134.986	121.514	164.548	152.143	218.935	183.341	128.136	108.228
Total 300-day workers.....	2,541	2,510	2,990	2,123	2,704	2,453	76,559	68,531

FALLS OR SLIDES OF ROCK OR OVERBURDEN

As previously indicated, falls or slides of rock or overburden were the leading cause of fatal accidents at quarries in 1930; they also ranked third as a cause of nonfatal injuries to men employed inside the quarries.

This class of accidents, while the chief cause of fatalities, was not among the contributors to the 12 permanent total disabilities at quarries during the year. Falls ranked fifth as a cause of permanent partial disabilities, however, and third as a cause of temporary injuries to men inside the quarries.

Definite progress in preventing accidents of this kind was indicated by a reduction in the accident-frequency rate for nonfatal injuries, which was only 14 per thousand employees in 1930 as compared with 17 in 1929.

EXPLOSIVES

Explosives ranked second as a cause of fatalities and tied with hand tools for ninth place as a cause of nonfatal injuries from accidents inside quarry pits in the United States in 1930. Exclusive of accidents at plants outside the quarries, 18.9 per cent of all fatalities and 2.8 per cent of all injuries were due to accidents caused by explosives. The death rate from explosives was 0.47, and the injury rate was 4.4 per thousand full-time or 300-day workers inside the quarries, as compared with 0.47 and 4.6 in 1929. The injury rates were lowest in quarries producing marble, sandstone, or slate.

The injury rate from explosives for all quarries producing dimension stone was 2.1, as compared with 5.1 for quarries producing non-dimension stone.

Table 22 shows the number of accidents due to explosives at all quarries in 1930, classified according to detailed causes and kind of stone produced.

TABLE 22.—*Fatalities and injuries due to explosives during the year ended December 31, 1930*

Kind of quarry	Transportation	Charging	Drilling into old holes	Striking in loose rock	Thawing	Caps, detonators, etc.	Un-guarded shots	Returned too soon	Pre-mature shots	De-layed blast	Mis-cellaneous	Total
Killed: ¹												
Cement rock.....											1	1
Limestone.....			1						9		1	11
Trap rock.....		1							1			2
Total, 1930.....		1	1						10		2	14
Injured:												
Cement rock.....			1			1		1			7	10
Granite.....		4					1		1		9	15
Limestone.....		1	5	4		4		4	19		54	91
Marble.....			1									1
Sandstone and blues-tone.....	1								1			2
Slate.....			1								1	2
Trap rock.....	1		1			2			3		3	10
Total, 1930.....	2	5	9	4		7	1	5	24		74	131

¹ No fatalities occurred in classes of quarries not listed.

HAULAGE

Haulage ranked fifth as a cause of fatalities and fourth as a cause of injuries in all quarry pits last year; it ranked fourth as a cause of fatalities and seventh as a cause of injuries outside the quarries. Over 8 per cent of the fatalities and more than 8 per cent of the injuries in the quarries were due to haulage accidents, while 13 per cent of the fatalities and 7 per cent of the injuries outside the quarries were due to the same class of accidents. Inside the quarries the death rate was 0.20 per thousand "inside" employees and the injury rate 13.5, as compared with 0.25 and 16.4 for the preceding year. Similar accidents outside the quarries resulted in a death rate of 0.10 and an injury rate of 5.0 in 1930.

A comparison of haulage accidents in quarry pits at dimension-stone quarries with those at nondimension-stone quarries revealed an

injury rate of 3.7 for the former and of 18.3 for the latter group; it also revealed an injury rate of 3.8 for outside plants at dimension-stone quarries and of 5.3 for outside plants at nondimension-stone quarries. Corresponding rates for previous years are given in Table 29, page 41.

TABLE 23.—Fatalities and injuries due to haulage during the year ended December 31, 1930

Kind of quarry	In and about quarry				In outside works				Grand total
	Hand and animal	Mechanical	Railway cars and locomotives	Total	Hand and animal	Mechanical	Railway cars and locomotives	Total	
Killed: 1									
Cement rock			1	1		1		1	2
Granite			1	1	1		1	2	3
Limestone		1	1	2			1	1	3
Trap rock	1	1		2					2
Total, 1930	1	2	3	6	1	1	2	4	10
Injured:									
Cement rock	4	1	32	37	7	1	13	21	58
Granite	3	3	14	20	3	11	4	18	38
Limestone	97	56	144	297	32	30	50	112	409
Marble	3		2	5	8	9	5	22	27
Sandstone and bluestone	2	8	7	17					17
Slate	8			8		2	3	5	13
Trap rock	8	8	5	21	6	2	7	15	36
Total, 1930	125	76	204	405	56	55	82	193	598

¹ No fatalities occurred in classes of quarries not listed.

MACHINERY

Nearly 11 per cent of the fatalities and 7 per cent of the injuries that occurred inside the quarries in the United States in 1930 were caused by accidents due to machinery; the same class of accidents caused 32 per cent of the fatalities and 13 per cent of all injuries outside the quarries. Machinery thus ranked third among the causes of fatalities and fifth as a cause of injuries to employees inside the quarries; it also ranked first as a cause of fatalities and third as a cause of injuries to employees at plants outside the quarries. The fatality rates were 0.27 per thousand employees inside and 0.25 per thousand employees outside the quarries. The injury rates were 10.87 and 9.34, respectively. For work inside the quarries the fatality rate increased, but the injury rate was reduced. For machinery accidents outside the quarries lower rates were recorded in 1930 for both fatalities and injuries.

The nonfatal injury rate for all quarries producing dimension stone was 11.57 and for all quarries producing nondimension stone 9.99, as compared with the previous year's rates of 14.36 and 12.43, respectively. Similar rates for machinery accidents at plants outside the quarries were 10.81 for plants at dimension-stone quarries and 8.51 for plants at nondimension-stone quarries. Corresponding rates for the previous year were 11.88 and 9.18, respectively.

The machinery accident rate was lowest at quarries that produced stone for the manufacture of cement and highest at trap-rock quarries,

the rate for the former group being 1.96 and that for the latter group 24.95, as compared with 10.87 for machinery accidents at all classes of quarries.

Similar rates for machinery accidents at plants outside the quarries were also most favorable for cement plants and least favorable for plants connected with trap-rock quarries.

TABLE 24.—Fatalities and injuries due to machinery during the year ended December 31, 1930

Kind of quarry	In and about quarry						In outside works						Grand total
	Hoisting cables and attachments	Guys, cranes, derricks, and attachments	Pumps and hoisting engines	Steam shovels	Other machinery	Total	Hoisting cables and attachments	Guys, cranes, derricks, and attachments	Pumps and hoisting engines	Crushers	Other machinery	Total	
Killed: ¹													
Cement rock							1			1	2	4	4
Limestone	2			1		3		2		1		3	6
Marble		3				3							3
Sandstone and bluestone		1				1							1
Trap rock				1		1	1			1	1	3	4
Total, 1930	2	4		2		8	1	3		3	3	10	18
Injured:													
Cement rock	1			2	3	6	3	4	2	6	31	46	52
Granite	20	18	2	3	21	64	5	13		7	24	49	113
Limestone	29	24	5	58	48	164	26	17	8	47	95	193	357
Marble	4	11	1		4	24	3	6	1	2	25	37	61
Sandstone and bluestone	4		2	4	8	18				3	11	14	32
Slate	5				4	10				1	4	5	15
Trap rock	7	1	1	13	18	40	1	2		6	7	16	56
Total, 1930	74	55	11	80	106	326	38	42	11	72	197	360	686

¹ No fatalities occurred in classes of quarries not listed.

DIMENSION-STONE QUARRIES AND NONDIMENSION-STONE QUARRIES CLASSIFIED

In this bulletin dimension stone includes stone for building, monuments, pulpstone, grindstone, curbing, flagstone, foundations, paving blocks, electrical purposes, and roofing; nondimension stone includes stone for road work, fluxing, ballast, concrete, concrete blocks, refractories, furnace bottoms, brickmaking, granules, stucco, open-hearth smelters, sugar, glass, paper, paint, mineral wool, filter stone, poultry grit, and roofing gravel. Nondimension stone also includes some broken stone, such as rubble, riprap, and material used for sea walls, retaining walls, and bridge work.

ACCIDENTS IN DIMENSION-STONE QUARRIES AND NONDIMENSION-STONE QUARRIES

For comparison of their safety records, all quarries may be divided into two classes—those that produce dimension stone for monuments, building, etc., and those that produce stone to be crushed for use in the manufacture of cement or lime, for use as ballast, or for any other purpose that does not require the stone to be of any particular shape or dimension.

Since 1916, when data for the two classes of quarries were first compiled, the fatality rates for dimension-stone quarries as a class have been lower, except in 1928, than those for quarries producing nondimension stone. The nonfatal injury rate has also always been lower for dimension-stone quarries, except in 1927. This comparison relates to work inside the quarry pits.

Comparative rates for the two classes of quarries are given in Tables 26 and 29.

An examination of the accident rates in Table 29, considered separately, will show that, as a class, quarries that produce nondimension stone have higher injury rates from various kinds of accidents. For example, the rate for falls or slides of rock or overburden is much higher in nondimension-stone quarries than in dimension-stone quarries. Accidents from handling rock are also more numerous at quarries producing nondimension stone. Moreover, haulage accidents are of greater frequency per man employed in nondimension-stone quarries as are also accidents caused by explosives. On the other hand, accidents caused by machinery, hand tools, and drilling have usually been more frequent at dimension-stone than at nondimension-stone quarries.

The situation at "outside" plants is quite different from that inside the quarry pits. The figures show higher injury rates at outside plants for dimension-stone quarries than at outside plants for nondimension-stone quarries. Strictly speaking, outside work at the two classes of quarries is hardly comparable. The handling and dressing of dimension stone are quite different from the operations connected with handling and treatment of crushed stone, particularly when the latter type of stone is used in the manufacture of cement or lime. Table 29 shows that the higher rates for outside work at dimension-stone quarries are due to a greater frequency of accidents from machinery, hand tools, falling objects, flying objects, and handling materials. The figures covering all kinds of accidents at "outside" plants for dimension-stone quarries in 1930 showed 0.90 fatal and 105.91 nonfatal injuries per thousand men employed (300-day workers) at those plants, as compared with 0.79 fatalities and 57.75 injuries per thousand employed at outside plants for nondimension-stone quarries.

Accidents at dimension-stone and nondimension stone quarries ¹

[Per thousand 300-day workers]

Year	Dimension stone		Nondimension stone		Year	Dimension stone		Nondimension stone	
	Fatal	Nonfatal	Fatal	Nonfatal		Fatal	Nonfatal	Fatal	Nonfatal
1930	2.34	151	2.50	152	1922	1.94	140	2.50	190
1929	1.43	169	2.59	176	1921	3.23	104	3.40	231
1928	2.21	156	1.90	166	1920	1.22	152	2.66	213
1927	2.22	200	2.55	189	1919	2.15	137	4.23	240
1926	2.50	171	2.64	192	1918	1.41	169	1.89	193
1925	1.94	181	2.59	193	1917	1.04	161	2.08	193
1924	1.28	161	2.25	189	1916	2.79	126	3.05	239
1923	1.15	144	2.21	187					

Figures relate to quarries only; outside plants not included.

TABLE 25.—Dimension-stone and nondimension-stone quarries: Men employed and number killed and injured during the year ended December 31, 1930

Kind of quarry	In and about quarry						In outside works						Total									
	Men em- ployed	Days of labor per- formed	Aver- age days active	Killed	In- jured	Men em- ployed	Days of labor per- formed	Aver- age days active	Killed	In- jured	Men em- ployed	Days of labor per- formed	Aver- age days active	Killed	In- jured	Men em- ployed	Days of labor per- formed	Aver- age days active	Killed	In- jured		
Dimension stone:																						
Granite.....	3,324	806,867	243	4	422	3,251	810,756	249	4	405	6,575	1,617,623	246	8	827							
Limestone.....	2,275	544,787	239	5	335	2,265	593,029	262	2	200	4,540	1,137,816	251	7	535							
Marble.....	2,264	588,484	260	4	222	3,678	1,052,865	286	2	271	5,942	1,641,349	276	6	493							
Sandstone and blueshale.....	1,209	274,028	227	4	102	849	224,308	264	1	58	2,058	498,331	242	5	160							
Slate.....	1,527	325,330	213	1	187	1,347	291,745	217	1	120	2,874	617,075	215	1	307							
Trap rock.....	1,157	28,235	180	2	23	1,141	24,161	171	1	4	2,208	52,396	176	2	27							
Total.....	10,756	2,567,731	239	20	1,291	11,531	2,996,859	260	9	1,058	22,287	5,564,590	250	29	2,349							
Nondimension stone:																						
Cement rock.....	3,590	918,273	256	4	300	16,408	5,046,675	308	13	378	19,998	5,964,948	288	17	678							
Granite.....	1,105	224,455	203	3	117	9,288	54,325	189	3	35	1,393	278,780	200	3	152							
Limestone.....	17,172	3,917,884	228	32	2,055	9,899	2,650,281	268	6	1,021	27,071	6,568,165	243	38	3,076							
Marble.....	39	11,347	291	3	52	52	13,750	264	8	8	91	25,097	276	11	11							
Sandstone and blueshale.....	1,006	174,103	173	1	87	225	36,613	163	1	19	1,231	210,716	171	1	106							
Slate.....	11	2,008	183	7	1	13	2,725	210	1	24	24	4,733	197	2	2							
Trap rock.....	1,908	399,800	210	7	301	904	200,573	222	2	79	2,812	600,373	214	9	380							
Total.....	24,831	5,647,870	227	47	2,864	27,789	8,004,942	288	21	1,541	52,620	13,652,812	259	68	4,405							
All other and not stated:																						
Granite.....	1,142	259,994	228	1	133	1,304	340,997	262	1	79	2,446	600,991	246	1	212							
Limestone.....	1,872	418,991	224	4	269	710	165,846	234	6	66	2,582	584,837	227	4	335							
Marble.....	49	13,105	267	1	6	5	53,750	150	2	2	54	13,855	257	1	8							
Sandstone and blueshale.....	162	26,816	166	1	33	94	17,111	182	6	266	266	43,927	172	1	39							
Slate.....	50	13,000	260	1	14	7	2,170	310	1	57	57	15,170	266	1	14							
Trap rock.....	211	52,943	251	1	42	120	30,247	252	1	13	331	83,190	251	2	55							
Total.....	3,486	784,849	225	7	497	2,240	557,121	249	1	166	5,726	1,841,970	234	8	663							
Grand total.....	39,073	9,000,450	230	74	4,652	41,560	111,568,922	278	31	2,765	80,633	20,599,372	255	105	7,417							

TABLE 26.—Dimension-stone and nondimension-stone quarries: Accident rates compared on a 300-day basis during the year ended December 31, 1930¹

Kind of quarry	Number of 300-day workers				Killed				Injured				Total		
	In and about quarry		In outside works		In and about quarry		In outside works		In and about quarry		In outside works		Num-ber	Per thou-sand 300-day work-ers	
	In and about quarry	Total	In outside works	Total	Num-ber	Per thou-sand 300-day work-ers	Num-ber	Per thou-sand 300-day work-ers	Num-ber	Per thou-sand 300-day work-ers	Num-ber	Per thou-sand 300-day work-ers			
													Num-ber	Per thou-sand 300-day work-ers	Num-ber	Per thou-sand 300-day work-ers
Dimension stone:															
Granite.....	2,690	5,322	4	1.48	4	1.49	4	1.48	422	156.88	405	149.89	827	153.38	
Limestone.....	1,816	3,798	5	2.75	2	2.75	2	1.01	355	184.47	200	101.56	525	141.05	
Marble.....	1,962	3,471	4	2.04	2	2.04	2	1.01	226	113.15	277	77.23	468	90.11	
Sandstone and bluestone.....	913	1,661	4	4.38	1	1.34	1	1.34	102	117.72	158	77.84	169	96.33	
Slate.....	1,084	2,057	1	1.92	1	1.92	1	1.49	187	172.51	120	123.33	307	146.25	
Trap rock.....	94	81	2	21.28	2	21.28	2	11.43	23	244.68	4	48.38	27	154.29	
Total.....	8,559	18,549	20	2.34	9	2.34	9	.90	1,291	150.84	1,058	105.91	2,349	126.64	
Nondimension stone:															
Cement rock.....	3,061	16,822	4	1.31	13	4.01	13	.77	300	98.01	378	22.47	678	34.10	
Granite.....	748	181	3	4.01	6	8.01	6	.68	117	156.42	45	198.37	152	163.62	
Limestone.....	13,060	21,894	32	2.45	32	2.45	32	1.74	2,065	157.35	1,028	116.38	3,076	140.50	
Marble.....	38	46	84	2.21	1	2.63	1	1.42	87	160.00	6	156.74	108	130.95	
Sandstone and bluestone.....	580	122	702	1.72	1	1.72	1	1.42	87	160.00	19	156.74	108	130.95	
Slate.....	7	9	16	2.29	2	2.86	2	2.99	301	225.98	79	118.09	380	189.91	
Trap rock.....	1,332	669	7	5.26	2	5.26	2	2.99	301	225.98	79	118.09	380	189.91	
Total.....	18,826	26,683	47	2.50	21	2.50	21	.79	2,884	152.13	1,541	57.75	4,405	96.79	
All other and not stated:															
Granite.....	866	1,137	1	1.15	1	1.15	1	1.15	133	153.58	79	69.48	212	105.84	
Limestone.....	1,397	1,950	4	2.86	4	2.86	4	2.05	269	192.56	66	118.85	335	171.79	
Marble.....	44	2	46	11.24	1	11.24	1	6.85	93	370.79	6	103.26	99	267.12	
Sandstone and bluestone.....	89	57	140	1.57	7	1.57	7	1.57	114	127.78	14	274.51	14	274.51	
Slate.....	44	7	51	1.16	1	1.16	1	1.16	42	238.64	13	128.71	55	198.86	
Trap rock.....	176	101	277	1.56	1	1.56	1	1.56	42	238.64	13	128.71	55	198.86	
Total.....	2,616	1,857	4,473	2.68	7	2.68	7	.54	497	180.98	166	89.39	663	148.22	
Grand total.....	30,001	38,530	68,531	2.47	31	2.47	31	.80	4,632	155.00	2,765	71.76	7,417	108.23	

¹ Rates not shown where number of 300-day workers employed was less than 50.

TABLE 29.—Dimension-stone and nondimension-stone quarries: Nonfatal-injury rates, by causes, compared on a 500-day basis for the years ended December 31, 1926 to 1930

Cause	Dimension stone					Nondimension stone				
	1926	1927	1928	1929	1930	1926	1927	1928	1929	1930
In and about quarry:										
1. Falls or slides of rock or overburden.....	9.20	10.32	10.84	12.73	8.76	20.52	23.95	22.12	19.39	15.35
2. Handling materials.....	29.93	36.08	29.27	39.92	35.40	35.07	32.70	38.73	42.02	45.04
3. Timber or hand tools.....	11.35	10.23	7.87	7.23	4.79	7.15	6.21	5.92	5.74	3.88
4. Explosives.....	5.09	3.47	2.40	3.87	2.10	8.23	6.48	5.23	5.60	5.10
5. Haulage.....	5.18	8.10	5.28	4.89	3.74	22.34	22.34	17.71	21.81	18.27
6. Falls of persons.....	9.56	13.22	13.82	10.49	11.68	10.22	10.26	9.20	8.87	9.99
7. Falling objects (other than 1 and 2).....	10.09	11.87	10.65	10.79	9.11	10.33	10.03	8.43	7.47	5.74
8. Flying objects.....	22.89	34.06	23.32	28.61	22.20	24.38	25.31	20.70	21.94	16.47
9. Electricity.....	8.67	8.58	8.38	8.1	24	7.6	9.99	7.7	7.73	9.0
10. Drilling and channeling (by machine or hand).....	8.67	12.06	8.73	8.25	9.58	8.27	8.39	6.60	7.74	8.02
11. Machinery.....	18.05	22.86	15.06	14.36	11.57	16.47	14.56	10.86	12.43	9.99
12. Nails, splinters, etc.....	5.27	6.08	3.65	2.95	2.34	3.94	4.04	3.08	3.82	3.40
13. Boiler and air-tank explosions.....	1.88	2.03	2.21	2.24	1.64	3.18	3.81	2.19	2.09	1.59
14. Burns.....	32.97	28.56	22.74	21.49	27.69	30.52	20.85	14.46	15.75	9.51
15. Other causes.....	170.73	199.52	156.22	169.14	150.84	191.97	189.04	166.00	176.18	152.13
Total injured in and about quarry.....	4.75	5.05	3.91	2.20	3.81	11.24	9.68	8.44	6.00	5.28
In outside works:	19.35	21.68	16.19	11.88	10.81	14.07	13.34	10.96	9.18	8.51
16. Haulage.....	13.39	17.93	7.52	7.76	5.61	9.28	8.32	6.21	5.29	3.11
17. Machinery.....	4.62	8.48	3.91	1.92	2.50	5.26	4.62	3.02	2.43	1.91
18. Hand tools.....	.97	1.61	.57	.48	.10	1.92	1.77	1.26	1.21	1.01
19. Nails, splinters, etc.....	10.95	13.63	8.00	6.80	10.71	13.40	11.99	9.24	9.04	7.35
20. Electricity.....	18.01	19.21	10.00	12.46	9.71	13.33	13.55	9.54	6.93	4.83
21. Falls of persons.....	32.62	42.63	33.34	27.02	26.53	13.29	11.72	8.17	9.25	5.96
22. Falling objects (rocks, timbers, etc).....	39.92	25.23	24.77	27.02	23.23	3.24	2.41	2.83	9.29	6.60
23. Flying objects.....	1.83	2.58	1.05	1.06	1.10	8.62	7.34	7.34	6.15	4.87
24. Handling materials.....	22.39	21.57	22.10	14.95	11.81	19.59	11.59	11.59	9.25	8.32
25. Burns.....	168.80	179.89	131.36	113.55	105.91	116.75	105.61	78.60	74.02	57.75
26. Other causes.....	169.91	190.22	143.74	140.50	126.64	153.06	144.91	117.92	118.94	96.79
Total injured in outside works.....										
Grand total injured.....										

TABLE 30.—All quarries: Accidents during the year ended December 31, 1930, by States and severity of injury

State	Killed	Nonfatal			Grand total	
		Perma- nent total ¹	Perma- nent par- tial ²	Tem- porary ³		Total non- fatal
Alabama.....	1		7	189	196	197
Arkansas.....	2		2	25	27	27
California.....	8		6	578	584	592
Colorado.....			1	61	62	62
Connecticut.....	2		1	75	76	78
Georgia.....	1		4	140	144	145
Illinois.....	8	1	8	214	223	231
Indiana.....	7		15	362	377	384
Iowa.....	8		7	175	182	190
Kansas.....	2		2	90	92	94
Kentucky.....	5		7	104	111	116
Maine.....	2	3	2	155	160	162
Maryland.....	3		4	126	130	133
Massachusetts.....	6		14	397	411	417
Michigan.....			2	123	125	125
Minnesota.....	1		4	200	204	205
Missouri.....	1		24	409	433	434
New Hampshire.....			1	95	96	96
New Jersey.....	4	1	7	112	120	124
New Mexico.....				3	3	3
New York.....	4		22	403	425	429
North Carolina.....			1	94	95	95
Ohio.....	7		26	401	427	434
Oklahoma.....		7	12	71	90	90
Pennsylvania.....	13		29	1,041	1,070	1,083
Rhode Island.....				11	11	11
Tennessee.....	6		4	226	230	236
Texas.....			9	141	150	150
Utah.....	3		1	35	36	39
Vermont.....	5		10	370	380	385
Virginia.....	3		7	187	194	197
Washington.....			1	40	41	41
West Virginia.....	1		2	80	82	83
Wisconsin.....	2		7	211	218	220
Not segregated.....	2		4	208	212	214
Total, 1930.....	105	12	253	7,152	7,417	7,522

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

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

³ Disability for more than remainder of day of accident.

TABLE 31.—All quarries: Accidents during the year ended December 31, 1930, by causes and severity of injury

Cause	Killed	Nonfatal			Grand total	
		Perma- nent total ¹	Perma- nent par- tial ²	Tem- porary ³		Total non- fatal
1. Falls or slides of rock or overburden.....	24		15	404	419	443
2. Handling materials:						
(a) Handling rock at face.....	4	1	10	1,133	1,144	1,148
(b) Handling other material.....	1		3	161	164	165
3. Timber or hand tools.....		2	1	128	131	131
4. Explosives:						
(a) Transportation.....				2	2	2
(b) Charging.....	1	1		4	5	6
(c) Drilling into old holes.....	1		4	5	9	10
(d) Striking in loose rock.....				4	4	4

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

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

³ Disability for more than remainder of day of accident.

TABLE 31.—All quarries: Accidents during the year ended December 31, 1930, by causes and severity of injury—Continued

Cause	Killed	Nonfatal			Grand total
		Perma- nent total	Perma- nent par- tial	Tem- porary		Total non- fatal
4. Explosives—Continued.					
(e) Thawing.....					0
(f) Caps detonators, etc.....				7	7
(g) Unguarded shots.....				1	1
(h) Returned too soon.....				4	5
(i) Premature shots.....	10	1	10	13	34
(j) Delayed blast.....					0
(k) Miscellaneous.....	2		4	70	74
5. Haulage:					
(a) Hand and animal.....	1		4	121	126
(b) Mechanical.....	2		4	72	78
(c) Railway cars and locomotives.....	3	1	15	188	207
6. Falls of persons:					
(a) Falling into quarry from surface, benches, or face.....	2	1	5	178	186
(b) Falling from hoists, derricks, ladders, etc.....	2		1	116	119
7. Falling objects (other than 1 and 2).....	7		8	208	223
8. Flying objects:					
(a) From sledging.....	2		12	343	357
(b) Others.....	1		4	195	200
9. Electricity:					
(a) Direct contact with trolley wire.....				1	1
(b) Bar or tool striking trolley wire.....				1	1
(c) Contact with motor.....			1	1	2
(d) Others.....	1			17	18
10. Drilling and channelling (by machine or hand).....	1		8	236	245
11. Machinery:					
(a) Hoisting cables and attachments.....	2		7	67	76
(b) Guys, cranes, derricks, and attachments.....	4		6	49	59
(c) Pumps and hoisting engines.....			1	10	11
(d) Steam shovels.....	2		8	72	82
(e) Other machinery.....		2	16	88	106
12. Nails, splinters, etc.....			1	94	95
13. Boiler and air-tank explosions.....					0
14. Burns.....				51	51
15. Other causes.....	1		12	438	451
Total, in and about quarry.....	74	9	161	4,482	4,652
16. Haulage:					
(a) Hand and animal.....	1		2	54	57
(b) Mechanical.....	1		4	51	56
(c) Railway cars and locomotives.....	2		3	79	84
17. Machinery:					
(a) Hoisting cables and attachments.....	1		2	36	39
(b) Guys, cranes, derricks, and attachments.....	3		3	39	45
(c) Pumps and hoisting engines.....			1	10	11
(d) Crushers.....	3		2	70	75
(e) Other machinery.....	3		29	168	200
18. Hand tools.....			3	146	149
19. Nails, splinters, etc.....				82	82
20. Electricity:					
(a) Direct contact with trolley wire.....					0
(b) Bar or tool striking trolley wire.....					0
(c) Contact with motor.....				9	9
(d) Others.....	3			22	25
21. Falls of persons.....	5		6	308	319
22. Falling object (rocks, timbers, etc.).....	5		11	228	244
23. Flying objects:					
(a) From sledging.....			4	187	191
(b) From crushing.....	1			25	26
(c) Others.....			5	240	245
24. Handling materials:					
(a) Handling rock by hand.....	1		7	239	247
(b) Handling other materials.....		2	5	182	189
25. Burns.....	1	1	1	145	148
26. Other causes.....	1		4	350	355
Total, in outside works.....	31	3	92	2,670	2,765
Grand total.....	105	12	253	7,152	7,417
Dimension stone.....	29	1	79	2,269	2,349
Nondimension stone.....	68	11	153	4,241	4,405
All other and not stated.....	8		21	642	663

Permanent partial:¹																		
Cement rock.....	1	1	7	1	3	1	1	1	1	1	1	1	1	17	23	32		
Granite.....	1	1	11	1	2	3	2	2	2	2	2	2	2	12	27	76		
Limestone.....	2	1	3	1	1	1	1	1	1	1	1	1	1	37	139	141		
Marble.....	1	1	4	4	1	1	1	1	1	1	1	1	1	5	12	14		
Sandstone and bluestone.....	1	1	4	1	1	1	1	1	1	1	1	1	1	16	27	14		
Slate.....	1	1	2	2	1	1	1	1	1	1	1	1	1	2	12	8		
Trap rock.....	1	1	2	2	1	1	1	1	1	1	1	1	1	3	13	10		
Total.....	2	4	3	2	3	1	2	29	3	6	11	4	4	92	253	295		
Temporary:³																		
Cement rock.....	7	1	12	3	4	2	5	24	20	14	2	10	44	33	2	358	910	
Granite.....	3	10	4	5	13	7	23	24	5	5	36	39	131	4	83	52	1,164	
Limestone.....	30	28	49	24	14	7	47	84	70	47	156	112	23	18	70	58	3,799	
Marble.....	8	8	5	3	6	1	2	21	11	12	32	27	12	1	27	73	5,172	
Sandstone and bluestone.....	2	2	3	3	2	2	7	5	5	4	7	7	4	1	10	10	500	
Slate.....	2	2	3	3	1	1	4	10	6	4	13	4	13	2	12	10	278	
Trap rock.....	6	2	6	1	2	6	5	6	4	4	20	6	2	2	2	10	311	
Total.....	54	51	79	36	39	10	70	168	146	82	228	187	25	240	239	182	7,152	
All quarries:																		
Killed.....	1	1	2	1	3	3	3	3	3	3	5	5	1	1	1	1	105	126
Permanent total.....	2	4	3	2	3	1	2	29	3	3	6	11	4	2	1	2	3	12
Permanent partial.....	54	51	79	36	39	10	70	168	146	82	228	187	25	240	239	182	7,152	9,510
Temporary.....	56	55	82	38	42	11	72	197	149	82	239	191	25	245	246	189	2,765	7,417
Total, nonfatal.....	56	55	82	38	42	11	72	197	149	82	239	191	25	245	246	189	2,765	7,417

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

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

³ Disability for more than remainder of day of accident.

**LENGTH OF WORKDAY INSIDE QUARRIES AND ACCIDENT RATES
BASED THEREON**

About 33 per cent of all men employed in quarrying in the United States in 1930 worked at plants where 10 hours constituted a standard day's work. Other plants, operating 8 hours a day, employed 30 per cent of the total number of workers, and 22 per cent worked at quarries where 9 hours was the standard shift. These three groups accounted for 85 per cent of all men working at quarries, not including men engaged in rock dressing, rock crushing, and other operations not directly connected with the quarrying of the stone.

The prevailing workday at quarries that produced dimension stone was 8 hours, while the 10-hour day prevailed at nondimension-stone quarries, as shown in Tables 33 and 36.

Accident rates at dimension-stone quarries indicated a better safety record at 9-hour plants than at either the 8-hour or 10-hour quarries. Nondimension-stone quarries experienced the best safety record in the 10-hour group.

Among quarries that produced dimension stone 8 hours was the standard day at granite quarries; 9 hours at marble, slate, and sandstone and bluestone quarries; and 10 hours at limestone and trap-rock quarries. Among nondimension-stone quarries the cement-rock quarries were about equally divided as to the 8-hour and 10-hour day; the standard at quarries producing limestone and sandstone and bluestone was the 10-hour day; 9 hours was the standard at quarries producing marble; while the 8-hour men were the largest group at granite quarries.

TABLE 33.—Accident data, based on hours of exposure of employees inside the quarries, during the year ended December 31, 1930

Length of shift	Men employed		Days of labor performed	Total hours	Average days per man	Average hours per man
	Actual number	Equivalent in 300-day workers				
ALL QUARRIES						
8 hours.....	11,701	8,987	2,696,097	21,568,776	230	1,843
9 hours.....	8,492	6,828	2,048,419	18,435,771	241	2,171
10 hours.....	12,986	9,538	2,861,588	23,615,880	220	2,204
11 hours.....	277	195	58,540	643,940	211	2,325
12 hours.....	27	18	5,255	63,060	195	2,336
All other and not stated.....	5,590	4,435	1,330,551	-----	238	-----
Total.....	39,073	30,001	9,000,450	-----	230	-----
DIMENSION-STONE QUARRIES						
8 hours.....	3,654	2,846	853,729	6,829,832	234	1,869
9 hours.....	2,907	2,520	755,971	6,803,739	260	2,340
10 hours.....	3,055	2,309	692,755	6,927,550	227	2,268
All other and not stated.....	1,140	884	265,276	-----	233	-----
Total.....	10,756	8,559	2,567,731	-----	239	-----
NONDIMENSION-STONE QUARRIES						
8 hours.....	7,242	5,478	1,643,444	13,147,552	227	1,815
9 hours.....	5,035	3,874	1,162,390	10,461,510	231	2,078
10 hours.....	8,450	6,144	1,843,310	18,433,100	218	2,181
11 hours.....	106	76	22,658	249,238	214	2,351
12 hours.....	-----	-----	-----	-----	-----	-----
All other and not stated.....	3,998	3,254	976,068	-----	244	-----
Total.....	24,831	18,826	5,647,870	-----	227	-----
ALL OTHER AND NOT STATED						
8 hours.....	805	663	198,924	1,591,392	247	1,977
9 hours.....	550	434	130,058	1,170,522	236	2,128
10 hours.....	1,481	1,085	325,523	3,255,230	220	2,198
All other and not stated.....	650	434	130,344	-----	201	-----
Total.....	3,486	2,616	784,849	-----	225	-----

Length of shift	Killed	Perma- nent total	Perma- nent partial	Temporary	Total non- fatal	Grand total
ALL QUARRIES						
8 hours.....	17	-----	33	1,343	1,376	1,393
9 hours.....	15	6	54	1,137	1,197	1,212
10 hours.....	28	2	50	1,517	1,569	1,597
11 hours.....	1	-----	5	40	45	46
12 hours.....	-----	-----	1	4	5	5
All other and not stated.....	13	1	18	441	460	473
Total.....	74	9	161	4,482	4,652	4,726
DIMENSION-STONE QUARRIES						
8 hours.....	4	-----	11	468	479	483
9 hours.....	7	-----	17	303	320	327
10 hours.....	7	1	12	351	364	371
All other and not stated.....	2	-----	2	126	128	130
Total.....	20	1	42	1,248	1,291	1,311
NONDIMENSION-STONE QUARRIES						
8 hours.....	13	-----	19	748	767	780
9 hours.....	7	6	27	679	712	719
10 hours.....	17	1	36	1,013	1,050	1,067
11 hours.....	-----	-----	4	8	12	12
12 hours.....	-----	-----	-----	-----	-----	-----
All other and not stated.....	10	1	17	305	323	333
Total.....	47	8	103	2,753	2,864	2,911
ALL OTHER AND NOT STATED						
8 hours.....	-----	-----	3	127	130	130
9 hours.....	1	-----	10	155	165	166
10 hours.....	4	-----	2	153	155	159
All other and not stated.....	2	-----	1	46	47	49
Total.....	7	-----	16	481	497	504

TABLE 34.—Fatalities and injuries per million hours of exposure, classified by length of shift, during the year ended December 31, 1930

[Inside only]

Character of disability	8 hours	9 hours	10 hours	Total 8, 9, and 10 hours	
				1930	1929
ALL QUARRIES					
Fatal.....	0.788	0.814	0.978	0.874	0.761
Permanent total.....		.325	.070	.117	.086
Permanent partial.....	1.530	2.929	1.747	1.996	1.702
Temporary.....	62.266	61.674	53.013	58.248	61.941
Total injuries.....	63.796	64.928	54.830	60.361	63.679
Total fatalities and injuries.....	64.584	65.742	55.808	61.235	64.440
DIMENSION-STONE QUARRIES					
Fatal.....	.586	1.029	1.010	.876	.607
Permanent total.....			.145	.049	.043
Permanent partial.....	1.610	2.499	1.732	1.945	1.518
Temporary.....	68.523	44.534	50.667	54.569	61.941
Total injuries.....	70.133	47.033	52.544	56.563	63.502
Total fatalities and injuries.....	70.719	48.062	53.554	57.439	64.109
NONDIMENSION-STONE QUARRIES					
Fatal.....	.989	.669	.922	.880	.878
Permanent total.....		.573	.054	.167	.038
Permanent partial.....	1.445	2.581	1.953	1.950	1.813
Temporary.....	56.893	64.905	54.956	58.037	61.025
Total injuries.....	58.338	68.059	56.963	60.154	62.876
Total fatalities and injuries.....	59.327	68.728	57.885	61.034	63.754
ALL OTHER AND NOT STATED					
Fatal.....		.854	1.229	.831	.407
Permanent total.....					
Permanent partial.....	1.885	8.543	.614	2.493	1.494
Temporary.....	79.804	132.420	47.001	72.293	68.454
Total injuries.....	81.689	140.963	47.615	74.786	69.948
Total fatalities and injuries.....	81.689	141.817	48.844	75.617	70.355

TABLE 35.—All quarries: Accident and labor data, based on length of shift, during the year ended December 31, 1930

Length of shift (hours)	In and about quarry						In outside works						Total					
	Men em- ployed	Days of labor per- formed	Average days active	Killed	Injured	Men em- ployed	Days of labor per- formed	Average days active	Killed	Injured	Men em- ployed	Days of labor per- formed	Average days active	Killed	Injured			
Cement rock:																		
8 hours.....	1,288	316,521	250	2	190	4,871	1,576,698	324	7	149	6,139	1,893,219	308	9	339			
9 hours.....	1,463	124,105	268	2	20	366	116,938	320	2	2	829	241,043	291	2	22			
10 hours.....	1,277	331,192	259	2	76	1,233	376,917	306	2	20	2,510	708,109	282	2	96			
11 hours.....	28	7,560	270	2	290	290	92,865	320	2	22	318	100,425	316	2	22			
12 hours.....	554	138,895	251	14	1,882	584,781	311	2	4	86	8,320	2,437,371	293	4	100			
All other and not stated.....						7,766	2,298,476	296	2	86	8,320	2,437,371	293	2	100			
Total.....	3,590	918,273	256	4	300	16,408	5,046,675	308	13	378	19,998	5,964,948	298	17	678			
Granite:																		
8 hours.....	3,546	846,226	239	4	457	3,838	959,245	250	3	445	7,384	1,805,471	245	7	902			
9 hours.....	339	72,415	214	2	34	1,199	56,159	282	2	26	7,588	128,574	239	2	60			
10 hours.....	761	158,192	208	1	103	146	28,470	195	8	8	907	186,662	206	1	111			
11 hours.....	10	2,800	280	2	8	8	2,464	308	1	40	10	2,800	280	1	111			
12 hours.....	915	211,683	231	1	78	652	159,740	245	1	40	1,567	371,423	308	2	118			
All other and not stated.....																		
Total.....	5,571	1,291,316	232	8	672	4,843	1,206,078	249	4	519	10,414	2,497,394	240	12	1,191			
Limestone:																		
8 hours.....	5,113	1,188,283	232	7	518	2,166	637,203	294	4	224	7,279	1,825,486	251	11	742			
9 hours.....	4,304	1,000,121	232	4	726	1,954	501,006	256	2	225	6,258	1,501,127	240	6	951			
10 hours.....	8,437	1,861,890	221	18	1,106	3,660	913,688	250	1	441	12,097	2,775,578	229	19	1,547			
11 hours.....	218	44,778	205	1	44	48	11,477	239	6	6	666	56,265	211	1	50			
12 hours.....	4	1,000	250	11	265	662	178,141	269	40	40	666	179,141	269	40	40			
All other and not stated.....	3,243	785,590	242	11	265	4,384	1,167,641	266	1	351	7,627	1,953,231	256	12	616			
Total.....	21,319	4,881,662	229	41	2,659	12,874	3,409,156	265	8	1,287	34,193	8,290,818	242	49	3,946			
Marble:																		
8 hours.....	112	30,105	269	2	21	169	50,039	296	2	58	281	80,144	285	4	79			
9 hours.....	1,101	324,517	295	2	102	2,577	769,861	299	2	156	3,678	1,094,378	298	2	268			
10 hours.....	974	215,659	221	2	80	850	209,040	246	2	36	1,824	424,689	233	2	116			
11 hours.....																		
12 hours.....	165	42,655	259	2	28	33	9,204	279	8	23	33	9,204	279	8	8			
All other and not stated.....						106	29,221	276	2	23	271	71,876	265	2	51			
Total.....	2,352	612,936	261	4	231	3,735	1,067,365	286	2	281	6,087	1,680,301	276	6	512			

TABLE 35.—All quarries: Accident and labor data, based on length of shift, during the year ended December 31, 1930—Continued

Length of shift (hours)	In and about quarry						In outside works						Total					
	Men em- ployed	Days of labor per- formed	Average days active	Killed	Injured	Men em- ployed	Days of labor per- formed	Average days active	Killed	Injured	Men em- ployed	Days of labor per- formed	Average days active	Killed	Injured			
Sandstone and bluestone:																		
8 hours.....	459	69,588	152	1	44	205	44,173	215	---	46	664	113,761	171	1	90			
9 hours.....	832	190,539	229	2	88	531	145,966	275	---	4	1,363	336,505	247	2	92			
10 hours.....	759	153,635	202	2	79	263	49,518	178	1	27	1,022	203,153	199	3	106			
11 hours.....	---	---	---	---	---	15	2,625	185	---	---	---	2,625	175	---	---			
12 hours.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
All other and not stated.....	327	61,185	187	1	11	154	35,745	232	---	6	481	96,930	202	1	17			
Total.....	2,377	474,947	200	6	222	1,168	278,027	238	1	83	3,545	752,974	212	7	305			
Slate:																		
8 hours.....	500	104,470	209	---	50	467	99,148	212	---	46	967	203,618	211	---	96			
9 hours.....	863	202,253	234	1	109	600	144,880	241	---	53	1,463	347,133	237	1	162			
10 hours.....	179	25,994	145	---	32	137	24,012	175	---	4	316	50,006	158	---	36			
11 hours.....	21	3,402	162	---	1	20	3,240	162	---	3	41	6,642	162	---	4			
12 hours.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
All other and not stated.....	25	4,219	169	---	10	143	25,360	177	---	15	168	29,579	176	---	25			
Total.....	1,588	340,338	214	1	202	1,367	296,640	217	---	121	2,955	636,978	216	1	323			
Trap rock:																		
8 hours.....	703	140,904	200	3	96	196	41,061	209	---	19	899	181,965	202	3	115			
9 hours.....	590	134,469	228	4	118	396	95,895	242	2	27	986	230,364	234	6	145			
10 hours.....	599	115,026	192	3	93	354	70,976	200	1	23	953	186,002	195	4	116			
11 hours.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
12 hours.....	23	4,255	185	---	5	9	1,665	185	---	---	32	5,920	185	---	5			
All other and not stated.....	361	86,324	239	---	54	210	45,384	216	---	27	571	131,708	231	---	81			
Total.....	2,276	480,978	211	10	366	1,165	254,981	219	3	96	3,441	735,959	214	13	462			
Total:																		
8 hours.....	11,701	2,696,097	230	17	1,376	11,912	3,407,567	286	14	987	23,613	6,103,664	288	31	2,363			
9 hours.....	8,492	2,048,419	241	15	1,197	6,623	1,830,705	276	6	493	15,115	3,879,124	257	21	1,690			
10 hours.....	12,986	2,861,588	220	28	1,569	6,638	1,671,351	252	3	559	19,624	4,532,939	231	31	2,128			
11 hours.....	277	58,540	211	1	45	373	110,207	295	---	31	650	4,168,747	260	1	76			
12 hours.....	27	5,255	195	---	5	2,594	776,255	299	---	147	2,621	781,510	298	2	152			
All other and not stated.....	5,590	1,330,551	238	13	460	13,420	3,762,837	280	6	548	19,010	5,063,388	288	19	1,008			
Total.....	39,073	9,000,450	230	74	4,652	41,560	11,568,922	278	31	2,765	80,633	20,569,372	265	105	7,417			

TABLE 36.—All quarries: Number of men employed, and number killed and injured, classified by kind of quarry and length of shift, during the year ended December 31, 1930

Kind of quarry	8 hours			9 hours			10 hours			All other and not stated			Total		
	Men- employed	Killed	Injured	Men- employed	Killed	Injured	Men- employed	Killed	Injured	Men- employed	Killed	Injured	Men- employed	Killed	Injured
Dimension stone:															
In and about quarry—															
Cement rock.....	2, 831	3	362	189	1	21	86	22	218	17	4	422	3, 324	4	435
Granite.....	92		35	273		53	1, 439	4	471	186	1	5	2, 275	5	222
Limestone.....	84		16	1, 041	2	98	974	2	80	28		4	2, 264	4	102
Marble.....	131	1	17	579	2	48	272	31	227	6	1	187	1, 209	4	187
Sandstone and bluestone.....	492		49	810	1	95	179	32	46	11		2	1, 527	1	23
Slate.....	24			15	1	5	105	1	13	5		2	1, 157	2	23
Trap rock.....															
Total.....	3, 654	4	479	2, 907	7	320	3, 055	7	364	128	2	20	10, 756	20	1, 281
In outside works—															
Cement rock.....	3, 071	3	355	79		26	9		1	23		4	3, 251		405
Granite.....	160		18	179	1	25	385	1	77	80	1	2	2, 265	2	200
Limestone.....	161		54	2, 561	2	152	824	34	34	31	2	2	3, 678	2	271
Marble.....	114		40	462		2	131	1	13	3		1	3, 849	1	58
Sandstone and bluestone.....	454		45	593		53	137	4	4	18		1	1, 347		130
Slate.....	11			18			54			4			1, 141		4
Trap rock.....															
Total.....	3, 971	3	512	3, 892	3	258	1, 540	2	129	159	1	9	11, 531	9	1, 088
Nondimension stone:															
In and about quarry—															
Cement rock.....	1, 268	2	190	463		20	1, 277	2	76	14		4	3, 590		300
Granite.....	306	1	24	133	1	9	287		40	44		3	1, 105		117
Limestone.....	4, 722	7	442	3, 755	4	566	5, 977	12	824	223	9	32	17, 172	32	2, 055
Marble.....	8		31	3		3	39		3	5		1	1, 006		87
Sandstone and bluestone.....	286		22	189		22	444	1	38	87		1	1, 006		11
Slate.....	8		1	3		92	465	2	72	338		7	1, 908		301
Trap rock.....	644	3	88	461	2	712	8, 450	17	1, 050	4, 104	10	335	24, 831	47	2, 864
Total.....	7, 242	13	767	5, 085	7	712	8, 450	17	1, 050	4, 104	10	335	24, 831	47	2, 864
In outside works—															
Cement rock.....	4, 871	7	149	366		2	1, 233		20	9, 938	6	207	16, 408	13	378
Granite.....	126		22	12			50		1	100		12	288		35
Limestone.....	1, 893	4	198	1, 665	1	195	3, 043		335	3, 298	1	293	9, 899	6	1, 021
Marble.....	3		2	16		2	26		2	2			52		8
Sandstone and bluestone.....	50		6	55		1	107		11	13		1	225		19
Slate.....	13												13		1
Trap rock.....	175		19	308	1	21	287	1	23	134		16	904		79
Total.....	7, 131	11	397	2, 422	2	223	4, 746	1	392	13, 490	7	629	27, 789	21	1, 541

TABLE 37.—Percentage of men employed at plants working shifts of indicated hours per day in 1930¹

Kind of quarry	Dimension stone					Nondimension stone				
	8 hours	9 hours	10 hours	All other and not stated	Total	8 hours	9 hours	10 hours	All other and not stated	Total
In and about quarry:										
Cement rock.....						35.32	12.90	35.57	16.21	100.00
Granite.....	85.17	5.68	2.59	6.56	100.00	27.69	12.04	25.97	34.30	100.00
Limestone.....	4.05	12.00	63.25	20.70	100.00	27.50	21.87	34.80	15.83	100.00
Marble.....	3.71	45.98	43.02	7.29	100.00	20.51	79.49			100.00
Sandstone and bluestone.....	10.83	47.89	22.50	18.78	100.00	28.43	18.79	44.13	8.65	100.00
Slate.....	32.22	53.05	11.72	3.01	100.00	72.73	27.27			100.00
Trap rock.....	15.29	9.55	66.88	8.28	100.00	33.75	24.16	24.37	17.72	100.00
Total.....	33.97	27.03	28.40	10.60	100.00	29.16	20.28	34.03	16.53	100.00
In outside works:										
Cement rock.....						29.69	2.23	7.51	60.57	100.00
Granite.....	94.46	2.43	.28	2.83	100.00	43.75	4.17	17.36	34.72	100.00
Limestone.....	7.06	7.90	17.00	68.04	100.00	19.12	16.82	30.74	33.32	100.00
Marble.....	4.38	69.63	22.40	3.59	100.00	5.77	30.77	50.00	13.46	100.00
Sandstone and bluestone.....	13.43	54.42	15.43	16.72	100.00	22.22	24.44	47.56	5.78	100.00
Slate.....	33.71	44.02	10.17	12.10	100.00	100.00				100.00
Trap rock.....	7.80	12.77	38.30	41.13	100.00	19.36	34.07	31.75	14.82	100.00
Total.....	34.44	33.75	13.36	18.45	100.00	25.66	8.72	17.08	48.54	100.00

¹ Based on figures in Table 36.

TABLE 38.—Dimension-stone and nondimension-stone quarries: Labor and accident data, classified by kind of quarry and length of shift, during the year ended December 31, 1930

Kind of quarry	8 hours					9 hours				
	Men employed	Days of labor performed	Total hours	Killed	Injured	Men employed	Days of labor performed	Total hours	Killed	Injured
Dimension stone:										
In and about quarry—										
Granite.....	2,831	689,233	5,513,864	3	362	189	46,664	419,976	1	21
Limestone.....	92	16,854	134,832		35	273	62,054	558,486		53
Marble.....	84	21,993	175,944		16	1,041	308,177	2,773,593	2	48
Sandstone and bluestone.....	131	20,247	161,976	1	17	579	146,278	1,916,502	2	98
Slate.....	492	102,702	821,616		49	810	189,013	1,701,117	1	95
Trap rock.....	24	2,700	21,600		1	15	3,785	34,065	1	5
Total.....	3,654	853,729	6,829,832	4	479	2,907	755,971	6,803,739	7	320
In outside works—										
Granite.....	3,071	762,741	6,101,928	3	355	79	21,571	194,139		26
Limestone.....	160	50,345	402,760		18	179	35,982	323,838	1	25
Marble.....	161	48,497	387,976		54	2,561	765,784	6,892,056	2	152
Sandstone and bluestone.....	114	28,564	228,512		40	462	136,974	1,232,766		2
Slate.....	454	96,423	771,384		45	593	142,710	1,284,890		53
Trap rock.....	11	1,050	8,400			18	4,347	39,123		
Total.....	3,971	987,620	7,900,960	3	512	3,892	1,107,368	9,966,312	3	258
Nondimension stone:										
In and about quarry—										
Cement rock.....	1,268	316,521	2,532,168	2	190	463	124,105	1,116,945		20
Granite.....	306	50,551	404,408	1	24	133	21,156	190,404	1	9
Limestone.....	4,722	1,100,451	8,803,608	7	442	3,755	870,583	7,835,247	4	566
Marble.....	8	2,112	16,896		31	9	9,235	83,115		3
Sandstone and bluestone.....	286	41,937	335,496		22	189	35,787	322,083		22
Slate.....	8	1,768	14,144		3	240	2,160			
Trap rock.....	644	130,104	1,040,832	3	88	461	101,284	911,556	2	92
Total.....	7,242	1,643,444	13,147,552	13	767	5,035	1,162,390	10,461,510	7	712
In outside works—										
Cement rock.....	4,871	1,576,698	12,613,584	7	149	366	116,938	1,052,442		2
Granite.....	126	20,072	160,576		22	12	2,108	18,972		
Limestone.....	1,893	557,065	4,456,520	4	198	1,665	439,080	3,951,720	1	195
Marble.....	3	792	6,336		2	16	4,077	36,693		4
Sandstone and bluestone.....	50	7,700	61,600		6	55	8,249	74,241		1
Slate.....	13	2,725	21,800		1					
Trap rock.....	175	37,251	298,008		19	308	75,311	677,799	1	21
Total.....	7,131	2,202,303	17,618,424	11	397	2,422	645,763	5,811,867	2	223

TABLE 38.—Dimension-stone and nondimension-stone quarries: Labor and accident data, classified by kind of quarry and length of shift, during the year ended December 31, 1930—Continued

Kind of quarry	10 hours					Total 8, 9, and 10 hours				
	Men employed	Days of labor performed	Total hours	Killed	Injured	Men employed	Days of labor performed	Total hours	Killed	Injured
Dimension stone:										
In and about quarry—										
Granite.....	86	23,450	234,500	---	22	3,106	759,347	6,168,340	4	405
Limestone.....	1,439	348,076	3,480,760	4	186	1,804	426,984	4,174,078	4	274
Marble.....	974	215,659	2,156,590	2	80	2,099	545,829	5,106,127	4	194
Sandstone and blue-stone.....	272	61,832	618,320	---	31	982	228,357	2,096,798	3	96
Slate.....	179	25,994	259,940	---	32	1,481	317,709	2,782,673	1	176
Trap rock.....	105	17,744	177,440	1	13	144	24,229	233,105	2	18
Total.....	3,055	692,755	6,927,550	7	364	9,616	2,302,455	20,561,121	18	1,163
In outside works—										
Granite.....	9	909	9,090	---	1	3,159	785,221	6,305,157	3	382
Limestone.....	385	96,552	965,520	1	77	724	182,879	1,692,118	2	120
Marble.....	824	202,280	2,022,800	---	34	3,546	1,016,561	9,302,832	2	240
Sandstone and blue-stone.....	131	26,269	262,690	1	13	707	191,807	1,723,968	1	55
Slate.....	137	24,012	240,120	---	4	1,184	263,145	2,295,894	---	102
Trap rock.....	54	8,662	86,620	---	---	83	14,059	134,143	---	---
Total.....	1,540	358,684	3,586,840	2	129	9,403	2,453,672	21,454,112	8	899
Nondimension stone:										
In and about quarry—										
Cement rock.....	1,277	331,192	3,311,920	2	76	3,008	771,818	6,961,033	4	286
Granite.....	287	56,749	567,490	---	40	726	128,459	1,162,302	2	73
Limestone.....	5,977	1,281,020	12,810,200	12	824	14,454	3,252,054	29,449,055	23	1,832
Marble.....	---	---	---	---	---	39	11,347	100,011	---	3
Sandstone and blue-stone.....	444	84,115	841,150	1	38	919	161,839	1,498,729	1	82
Slate.....	---	---	---	---	---	11	2,008	16,304	---	1
Trap rock.....	465	90,234	902,340	2	72	1,570	321,622	2,854,728	7	252
Total.....	8,450	1,843,310	18,433,100	17	1,050	20,727	4,649,144	42,042,162	37	2,529
In outside work—										
Cement rock.....	1,233	376,917	3,769,170	---	20	6,470	2,070,553	17,435,196	7	171
Granite.....	60	10,410	104,100	---	1	188	32,590	283,648	---	23
Limestone.....	3,043	767,620	7,676,200	---	335	6,601	1,763,765	16,084,440	5	728
Marble.....	26	6,760	67,600	---	2	45	11,629	110,629	---	8
Sandstone and blue-stone.....	107	18,590	185,900	---	11	212	34,539	321,741	---	18
Slate.....	---	---	---	---	---	13	2,725	21,800	---	1
Trap rock.....	287	59,149	591,490	1	23	770	171,711	1,567,297	2	63
Total.....	4,746	1,239,446	12,394,460	1	392	14,299	4,087,612	35,824,751	14	1,012

TABLE 39.—All quarries: Injury rates, including fatal accidents, per million hours of exposure, classified by kind of quarry and length of shift, during the year ended December 31, 1930¹

Kind of quarry	Dimension stone				Nondimension stone			
	8 hours	9 hours	10 hours	Total, 8, 9, and 10 hours	8 hours	9 hours	10 hours	Total, 8, 9, and 10 hours
In and about quarry:								
Cement rock.....	---	---	---	---	75.82	17.91	23.55	41.66
Granite.....	66.20	52.38	93.82	66.31	61.82	52.52	70.49	64.53
Limestone.....	259.58	94.90	54.59	66.60	51.00	72.75	65.26	62.99
Marble.....	90.94	36.05	38.02	38.78	---	---	---	30.00
Sandstone and blue-stone.....	111.13	37.98	50.14	47.21	65.57	68.31	46.37	55.38
Slate.....	59.64	56.43	123.11	63.61	---	---	---	---
Trap rock.....	---	---	78.90	150.15	87.43	103.12	82.01	90.73
Total.....	70.72	48.06	53.55	57.44	59.33	68.73	57.89	61.03
In outside works:								
Cement rock.....	---	---	---	---	12.37	1.90	5.31	10.21
Granite.....	58.67	133.92	---	61.06	137.01	---	9.61	81.09
Limestone.....	44.69	80.29	80.79	72.10	45.33	49.60	43.64	45.57
Marble.....	139.18	22.34	16.81	26.01	---	---	---	72.31
Sandstone and blue-stone.....	175.05	1.62	53.29	32.48	---	---	59.17	55.95
Slate.....	58.34	41.26	16.66	44.43	---	---	---	---
Trap rock.....	---	---	---	---	63.76	32.46	40.58	41.47
Total.....	65.18	26.19	36.52	42.28	23.16	38.71	31.71	28.64

¹ Rates not shown where hours worked were less than 100,000.

TABLE 40.—*Dimension-stone and nondimension-stone quarries: Men employed, days of labor performed, and number killed and injured inside the quarries, classified by length of shift, during the year ended December 31, 1930*

State	Dimension stone								
	8 hours			9 hours			10 hours		
	Men employed	Days of labor performed	Killed and injured	Men employed	Days of labor performed	Killed and injured	Men employed	Days of labor performed	Killed and injured
Alabama.....				100	28,368	7	109	22,174	26
Arkansas.....							25	6,250	
California.....	119	27,301	22	14	3,320	4	8	2,400	5
Colorado.....	36	8,612	2	31	8,959	3			
Connecticut.....	97	26,750	10	12	3,600		20	3,200	
Georgia.....	75	18,250		317	93,100	20	17	4,570	1
Illinois.....	40	8,200	24	20	3,000	5	5	1,560	
Indiana.....	14	1,470	1	100	25,000	13	1,051	258,098	128
Iowa.....									
Kansas.....	3	451							
Kentucky.....							34	6,070	4
Maine.....	598	130,337	41	40	7,380	8			
Maryland.....	2	180		25	5,000	2	12	3,144	
Massachusetts.....	349	73,792	68	42	12,653				
Michigan.....									
Minnesota.....	315	80,415	86	54	13,662	11	30	4,788	6
Missouri.....	40	10,875	15	76	14,900	14	142	39,800	23
New Hampshire.....	245	58,857	29						
New Jersey.....	20	1,500		20	4,320		105	17,744	14
New Mexico.....									
New York.....	92	14,350	10	123	19,778	16	67	13,513	6
North Carolina.....	6	1,800							
Ohio.....	3	561	2	369	108,368	29	143	36,420	10
Oklahoma.....	14	2,750							
Pennsylvania.....	432	95,394	50	590	108,377	47	120	26,798	20
Rhode Island.....	46	11,609	1						
Tennessee.....				62	16,680	5	905	197,385	77
Texas.....	5	450		17	3,680	2	68	20,400	14
Utah.....	16	3,640	1						
Vermont.....	93	242,201	105	844	244,045	110			
Virginia.....							170	22,853	32
Washington.....	19	3,001							
West Virginia.....				59	11,933	8			
Wisconsin.....	106	26,204	8	75	17,825	17	20	5,348	5
Not segregated.....	31	4,779	8	7	2,023	6	4	240	
Total.....	3,654	853,729	483	2,907	755,971	327	3,055	692,755	371

TABLE 40.—*Dimension-stone and nondimension-stone quarries; Men employed, days of labor performed, and number killed and injured inside the quarries, classified by length of shift, during the year ended December 31, 1930—Contd.*

State	Nondimension stone								
	8 hours			9 hours			10 hours		
	Men employed	Days of labor performed	Killed and injured	Men employed	Days of labor performed	Killed and injured	Men employed	Days of labor performed	Killed and injured
Alabama.....	5	1,390	-----	134	36,003	32	459	88,483	32
Arkansas.....	28	1,120	-----	87	24,096	15	101	20,226	-----
California.....	869	198,927	264	86	19,196	19	45	11,316	9
Colorado.....	217	33,721	29	13	3,549	2	-----	-----	-----
Connecticut.....	-----	-----	-----	35	9,470	12	-----	-----	-----
Georgia.....	34	4,234	-----	50	12,000	4	238	58,296	23
Illinois.....	456	116,637	33	230	50,041	21	135	28,951	13
Indiana.....	184	41,514	6	10	2,880	-----	370	56,620	42
Iowa.....	110	26,050	44	73	18,398	9	196	57,994	32
Kansas.....	135	34,212	1	63	15,793	6	200	44,981	45
Kentucky.....	20	4,577	2	90	13,190	10	451	101,152	59
Maine.....	23	3,270	2	130	39,570	24	22	7,744	-----
Maryland.....	27	4,001	5	64	13,872	17	180	37,460	33
Massachusetts.....	94	17,784	20	314	65,447	75	38	6,498	-----
Michigan.....	-----	-----	-----	205	57,468	23	373	100,119	11
Minnesota.....	92	17,948	11	5	300	-----	4	940	-----
Missouri.....	167	30,231	18	370	82,391	80	455	104,439	54
New Hampshire.....	15	3,045	1	-----	-----	-----	-----	-----	-----
New Jersey.....	291	64,425	15	243	61,699	63	39	7,188	5
New Mexico.....	9	320	-----	23	3,970	1	52	5,616	2
New York.....	437	99,626	19	343	82,064	33	911	195,556	159
North Carolina.....	-----	-----	-----	14	1,820	1	50	6,300	2
Ohio.....	367	96,013	39	509	112,880	43	512	109,990	49
Oklahoma.....	-----	-----	-----	88	21,164	19	232	63,274	27
Pennsylvania.....	1,950	465,176	128	1,022	242,773	118	1,572	333,677	259
Rhode Island.....	-----	-----	-----	27	6,930	5	-----	-----	-----
Tennessee.....	39	12,200	10	20	6,000	-----	422	84,088	66
Texas.....	76	15,825	2	76	16,173	14	247	52,171	29
Utah.....	194	40,315	23	72	7,200	2	-----	-----	-----
Vermont.....	-----	-----	-----	29	8,099	4	15	1,860	4
Virginia.....	36	6,448	2	257	55,279	27	574	150,458	59
Washington.....	204	51,927	23	-----	-----	-----	-----	-----	-----
West Virginia.....	796	166,399	30	197	38,285	28	163	39,862	8
Wisconsin.....	16	3,600	3	126	26,950	10	149	25,366	23
Not segregated.....	351	82,509	50	30	7,440	2	245	42,685	22
Total.....	7,242	1,643,444	780	5,035	1,162,390	719	8,450	1,843,310	1,067

TABLE 41. *Dimension-stone and nondimension-stone quarries: Injury rates, including fatal accidents, by States, based on hours of exposure of employees inside the quarries during the year ended December 31, 1930*¹

[Rates indicate number of accidents per million hours worked]

State ²	Dimension stone			Nondimension stone		
	8 hours	9 hours	10 hours	8 hours	9 hours	10 hours
Alabama.....		27.42	117.25		98.76	36.17
Arkansas.....					69.17	
California.....	100.73			165.89	109.98	79.53
Colorado.....				107.50		
Connecticut.....	46.73					
Georgia.....		23.87			37.04	39.45
Illinois.....				35.37	46.63	44.90
Indiana.....		57.78	49.59	18.07		74.18
Iowa.....				211.13	54.35	55.18
Kansas.....				3.65	42.21	100.04
Kentucky.....					84.24	58.33
Maine.....	39.32				67.39	
Maryland.....					136.17	88.09
Massachusetts.....	115.19			140.58	127.33	
Michigan.....					44.47	10.99
Minnesota.....	133.68	89.46		76.61		
Missouri.....		104.40	57.79	74.43	107.89	51.70
New Hampshire.....	61.59					
New Jersey.....			78.90	29.10	113.45	
New York.....	87.11	89.89	44.40	23.84	44.68	81.31
Ohio.....		29.73	27.46	50.77	42.33	44.55
Oklahoma.....					99.75	42.67
Pennsylvania.....	65.52	48.19	74.63	34.40	54.01	77.62
Tennessee.....		33.31	39.01			78.49
Texas.....			68.63	15.80	96.18	55.59
Utah.....				71.31		
Vermont.....	54.19	50.08				
Virginia.....			140.03		54.27	39.21
Washington.....				55.37		
West Virginia.....		74.49		22.54	81.26	20.07
Wisconsin.....	38.16	105.97			41.23	90.67
Not segregated.....				75.75		51.54
Total.....	70.72	48.06	53.55	59.33	68.73	57.89

¹ Rates not shown where hours worked were less than 100,000.

² No accidents occurred in New Mexico, North Carolina, and Rhode Island.

TABLE 42.—All quarries: Number of plants and number of men employed inside the quarries, classified by length of workday, for the year ended December 31, 1930

State	8 hours		9 hours		10 hours		All other and not stated		Total inside	
	Number of plants	Number of employees	Number of plants	Number of employees	Number of plants	Number of employees	Number of plants	Number of employees	Number of plants	Number of employees
Alabama.....	1	5	7	234	16	653	2	33	26	925
Arkansas.....	1	28	4	87	4	126	4	95	13	336
California.....	86	1,072	16	136	4	53	12	316	118	1,577
Colorado.....	21	259	2	44	-----	-----	2	5	25	308
Connecticut.....	8	105	8	84	2	27	8	228	26	444
Georgia.....	6	139	5	367	8	255	3	143	22	904
Illinois.....	16	543	13	256	11	233	8	981	48	2,013
Indiana.....	11	348	2	110	39	1,576	3	292	55	2,326
Iowa.....	-----	-----	5	78	5	196	9	202	19	476
Kansas.....	11	142	2	63	6	216	5	102	24	523
Kentucky.....	2	20	6	160	23	510	2	58	33	748
Maine.....	20	664	7	220	1	22	-----	-----	28	906
Maryland.....	4	29	7	104	8	180	12	238	31	551
Massachusetts.....	32	550	24	366	1	38	2	67	59	1,021
Michigan.....	-----	-----	6	238	9	411	4	284	19	933
Minnesota.....	28	417	4	59	5	81	1	30	38	587
Missouri.....	8	207	24	497	18	634	9	508	59	1,846
New Hampshire.....	16	260	-----	-----	-----	-----	-----	-----	16	260
New Jersey.....	7	311	20	326	7	144	2	40	36	821
New Mexico.....	2	9	2	23	1	52	-----	-----	5	84
New York.....	16	535	42	489	33	992	8	205	99	2,221
North Carolina.....	2	131	1	14	5	290	5	285	13	720
Ohio.....	11	530	21	878	58	1,063	15	277	105	2,748
Oklahoma.....	2	14	4	88	7	291	1	31	14	424
Pennsylvania.....	55	2,429	78	1,575	-----	-----	41	669	174	4,673
Rhode Island.....	5	50	3	27	101	1,809	-----	-----	109	1,886
Tennessee.....	2	39	6	116	25	1,327	4	158	37	1,640
Texas.....	5	81	5	93	11	315	8	180	29	669
Utah.....	10	210	1	72	-----	-----	2	19	13	301
Vermont.....	19	931	31	894	1	15	2	6	53	1,846
Virginia.....	2	36	11	257	27	744	4	90	44	1,127
Washington.....	24	253	-----	-----	1	3	-----	-----	25	256
West Virginia.....	9	818	5	256	9	163	-----	-----	23	1,237
Wisconsin.....	7	114	19	244	22	255	10	256	58	869
Not segregated.....	36	422	2	37	13	312	8	96	59	867
Total.....	485	11,701	393	8,492	481	12,986	196	5,894	1,555	39,073

TABLE 43.—*Dimension-stone and nondimension-stone quarries: Men employed, days of labor performed, and number killed and injured, inside the quarries, during the year ended December 31, 1930*

State	Dimension stone				Nondimension stone				All other and not stated			
	Men employed	Days of labor performed	Killed	Injured	Men employed	Days of labor performed	Killed	Injured	Men employed	Days of labor performed	Killed	Injured
Alabama.....	209	50,542		33	631	133,799	1	63	85	23,375		17
Arkansas.....	28	6,826			308	62,781		21				
California.....	170	41,436	1	39	1,163	280,147	4	325	244	61,854	1	54
Colorado.....	72	17,706		5	230	37,270		31	6	432		
Connecticut.....	129	33,550	1	9	253	64,100		20	62	18,560		8
Georgia.....	552	142,882	1	21	322	74,530		27	30	5,250		3
Illinois.....	65	12,760		29	1,762	440,135	5	114	186	45,087		20
Indiana.....	1,457	363,151	5	179	564	101,014		48	195	41,859		17
Iowa.....					515	130,364	5	97	71	13,154		8
Kansas.....	3	451			500	116,728		57	20	3,912		4
Kentucky.....	34	6,070		4	619	129,719	4	68	83	18,881		19
Maine.....	638	137,717		49	175	50,584	1	25	93	20,736		28
Maryland.....	115	29,224		19	433	96,400	2	77	15	4,125		2
Massachusetts.....	391	86,445	1	67	513	104,144	3	118	117	31,611		19
Michigan.....	33	6,300		4	862	224,677		65	38	11,400		2
Minnesota.....	399	98,865		103	101	19,188		11	87	15,540		6
Missouri.....	279	65,775		48	1,411	323,775	1	175	156	28,539		57
New Hampshire.....	245	58,857		29	15	3,045		1				
New Jersey.....	145	23,564	1	13	613	142,030	2	81	63	15,296	1	9
New Mexico.....					84	9,906		3				
New York.....	286	48,124	1	31	1,837	414,664	2	214	98	22,366		17
North Carolina.....	23	4,860			232	39,470		8	465	95,628		32
Ohio.....	647	168,504	2	46	1,533	356,467	1	151	568	130,619	1	30
Oklahoma.....	14	2,750			351	94,048		46	59	16,220		7
Pennsylvania.....	1,179	259,378		131	5,032	1,138,766	8	536	271	51,725	2	44
Rhode Island.....	46	11,609		1	27	6,930		5	4	1,200		
Tennessee.....	1,088	246,175	2	100	518	114,350	3	76	34	8,409		3
Texas.....	140	38,330		16	529	117,202		53				
Utah.....	16	3,640		1	268	48,125	3	23	17	2,536		2
Vermont.....	1,777	486,746	3	212	48	10,359		8	21	5,850		
Virginia.....	170	22,853		32	957	239,667	2	102				
Washington.....	19	3,001			204	51,927		23	33	6,768		7
West Virginia.....	59	11,933	1	7	1,156	244,546		66	6	1,500		1
Wisconsin.....	281	70,377	1	49	355	71,041		42	249	56,059	1	56
Not segregated.....	47	7,330		14	710	155,972		84	110	26,358	1	25
Total.....	10,756	2,567,731	20	1,291	24,831	5,647,870	47	2,864	3,486	784,849	7	497

TABLE 44.—*Dimension-stone and nondimension-stone quarries: Fatality and injury rates per thousand 300-day workers, based on number of men employed inside the quarry, classified by dimension stone, nondimension stone, and all other and not stated, during the year ended December 31, 1930*¹

State	Dimension stone			Nondimension stone			All other and not stated		
	Number of 300-day workers	Fatality rate	Injury rate	Number of 300-day workers	Fatality rate	Injury rate	Number of 300-day workers	Fatality rate	Injury rate
Alabama.....	168		196.43	446	2.24	141.26	78		217.95
Arkansas.....	23			209		100.48			
California.....	138	7.25	282.61	934	4.28	347.97	206	4.85	262.14
Colorado.....	59		84.75	124		250.00	2		
Connecticut.....	111	9.01	81.08	214		93.46	62		129.03
Georgia.....	476	2.10	44.12	248		108.87	18		
Illinois.....	43			1,467	3.41	77.71	150		133.33
Indiana.....	1,210	4.13	147.93	337		142.43	140		121.43
Iowa.....				434	11.52	223.50	44		
Kansas.....	2			389		146.53	13		
Kentucky.....	20			433	9.24	157.04	63		301.59
Maine.....	459		106.75	169	5.92	147.93	69		405.80
Maryland.....	97		195.88	321	6.23	239.88	14		
Massachusetts.....	288	3.47	232.64	347	8.65	340.06	106		179.25
Michigan.....	21			749		86.78	38		
Minnesota.....	329		313.07	64		171.88	52		115.38
Missouri.....	219		219.18	1,080	.93	162.04	95		600.00
New Hampshire.....	196		147.96	10					
New Jersey.....	79	12.66	164.56	473	4.23	171.25	51	19.61	176.47
New Mexico.....				33					
New York.....	160	6.25	193.75	1,382	1.45	154.85	75		226.67
North Carolina.....	16			132		60.61	319		100.31
Ohio.....	562	3.56	81.85	1,188	.84	127.10	435	2.30	68.97
Oklahoma.....	9			314		146.50	54		129.63
Pennsylvania.....	865		151.45	3,796	2.11	141.20	172	11.63	255.81
Rhode Island.....	39			23			4		
Tennessee.....	821	2.44	121.80	381	7.87	199.48	28		
Texas.....	128		125.00	390		135.90			
Utah.....	12			161	18.63	142.86	8		
Vermont.....	1,623	1.85	130.62	35			19		
Virginia.....	76		421.05	799	2.50	127.66			
Washington.....	10			173		132.95	22		
West Virginia.....	40			815		80.98	5		
Wisconsin.....	235	4.26	208.51	237		177.22	186	5.38	301.08
Not segregated.....	25			519		161.85	88	11.36	284.09
Total.....	8,559	2.34	150.84	18,826	2.50	152.13	2,616	2.68	189.98

¹ Rates not shown where number of 300-day workers employed were less than 50.

DISTRIBUTION OF QUARRY WORKERS ACCORDING TO LENGTH OF SHIFT

The number of quarries operating 8 hours a day and of those operating 10 hours a day was about equal in 1930, a slightly larger number of employees working in the 10-hour group. As shown in Table 42, the 8-hour day prevailed at a majority of the quarries in California, Colorado, Maine, Massachusetts, Minnesota, New Hampshire, Utah, and Washington. In New Jersey and Vermont 9-hour quarries were in the majority, while 10 hours was the standard workday at most of the quarries in Alabama, Indiana, Kentucky, Ohio, Rhode Island, Tennessee, and Virginia.

SIZE OF QUARRIES AND PERIOD OF ACTIVITY

Seventy-two per cent of the total number of men working inside the quarry pits in the United States in 1930 were employed at less than 30 per cent of the total number of operating quarries. In dimension-stone quarries 26 per cent of the operating plants employed 74 per cent of the men, and in nondimension-stone quarries 31 per cent of the plants employed 72 per cent of the men.

A classification of quarries according to size, as indicated by the number of men employed, is given in Table 47; this table also presents the accident rates for each class of quarries when grouped as shown in the table.

Table 48 covers the same quarries as Table 47, but the data are arranged to show the number of days the quarries were in operation during the year. If all classes of quarries are considered, those that most closely approximated continuous operation during the year had the fewest accidents in proportion to the number of men employed.

Accident rates for the various groups of quarries are given in Tables 47 and 48, classified according to size of plant and number of days the plants were in operation.

If the quarry pits are considered as distinct from the mills or other outside plants the average size of the quarries may be indicated to some extent by the number of men employed. In quarries producing stone for the manufacture of cement the average pit employed 31 men. Similar averages showed 48 men for marble quarries, 27 men for limestone quarries, 24 men for slate quarries, 22 men for granite quarries, 17 men for trap-rock quarries, and 16 men for sandstone and bluestone quarries.

On the other hand, the outside plants, such as cement mills, rock-dressing plants, limekilns, and crushers, showed an average of 98 for marble, 77 for cement, 30 for granite, 23 for slate, 16 for sandstone and bluestone, 14 for limestone, and 8 for trap rock.

TABLE 45.—Number of men employed at plants working shifts of indicated hours per day in 1930

IN AND ABOUT QUARRY

Kind of quarry	Dimension stone			Nondimension stone		
	8 hours	9 hours	10 hours	8 hours	9 hours	10 hours
Cement rock.....				1,268	463	1,277
Granite.....	2,831	189	86	306	133	287
Limestone.....	92	273	1,439	4,722	3,755	5,977
Marble.....	84	1,041	974	8	31	.....
Sandstone and bluestone.....	131	579	272	286	189	444
Slate.....	492	810	179	8	3	.....
Trap rock.....	24	15	105	644	461	465
Total.....	3,654	2,907	3,055	7,242	5,035	8,450

IN OUTSIDE WORKS

Cement rock.....				4,871	366	1,233
Granite.....	3,071	79	9	126	12	50
Limestone.....	160	179	385	1,893	1,665	3,043
Marble.....	161	2,561	824	3	16	26
Sandstone and bluestone.....	114	462	131	50	55	107
Slate.....	454	593	137	13	.....	.....
Trap rock.....	11	18	54	175	308	287
Total.....	3,971	3,892	1,540	7,131	2,422	4,746

TABLE 46.—All quarries: Classification, by number of men employed and kind of stone quarried, during the year ended December 31, 1930

Number of men employed	Cement rock					Granite				
	Number of plants	Number employed	Days of labor performed	Killed	Injured	Number of plants	Number employed	Days of labor performed	Killed	Injured
In and about quarry:										
1 to 9.....	14	78	18,023	-----	5	119	560	111,249	-----	93
10 to 24.....	48	855	207,887	-----	37	72	1,054	234,326	3	152
25 to 49.....	38	1,303	336,406	2	37	33	1,129	257,674	2	118
50 to 99.....	13	802	201,660	1	30	18	1,160	263,695	2	136
100 or more.....	4	552	154,297	1	191	13	1,668	424,372	1	173
Total.....	117	3,590	918,273	4	300	255	5,571	1,291,316	8	672
In outside works:										
1 to 9.....	85	380	92,208	1	3	79	326	55,301	1	32
10 to 24.....	20	312	77,960	-----	4	34	514	119,295	-----	79
25 to 49.....	11	438	112,355	-----	38	26	846	208,136	-----	120
50 to 99.....	26	1,919	542,949	2	74	10	787	207,045	-----	141
100 or more.....	71	13,359	4,221,203	10	259	14	2,370	616,301	2	147
Total.....	213	16,408	5,046,675	13	378	163	4,843	1,206,078	4	519
In and about quarry:										
1 to 9.....	85	377	56,776	1	51	25	137	30,785	1	23
10 to 24.....	40	554	99,147	1	73	27	410	89,950	-----	46
25 to 49.....	16	486	96,910	3	26	4	115	25,602	-----	16
50 to 99.....	11	720	149,874	1	52	8	573	125,766	-----	56
100 or more.....	1	240	72,240	-----	20	3	353	68,235	-----	61
Total.....	153	2,377	474,947	6	222	67	1,588	340,338	1	202
In outside works:										
1 to 9.....	53	232	38,383	-----	19	21	107	23,098	-----	11
10 to 24.....	13	177	30,824	-----	19	11	190	44,761	-----	5
25 to 49.....	2	61	11,727	-----	4	23	759	161,492	-----	76
50 to 99.....	3	226	60,733	1	41	5	311	67,289	-----	29
100 or more.....	2	472	136,360	-----	-----	-----	-----	-----	-----	-----
Total.....	73	1,168	278,027	1	83	60	1,367	296,640	0	121
In and about quarry:										
1 to 9.....	263	1,317	244,521	2	216	13	65	15,997	-----	2
10 to 24.....	268	4,104	882,268	11	687	15	258	65,359	-----	27
25 to 49.....	142	4,771	1,022,464	11	718	8	242	63,691	-----	37
50 to 99.....	69	4,543	1,081,233	8	586	7	481	109,486	1	50
100 or more.....	38	6,584	1,651,176	9	452	6	1,306	358,403	3	115
Total.....	780	21,319	4,881,662	41	2,659	49	2,352	612,936	4	231
In outside works:										
1 to 9.....	587	2,272	502,223	2	219	14	59	14,831	-----	12
10 to 24.....	204	2,967	715,451	3	360	6	75	17,670	-----	-----
25 to 49.....	68	2,224	609,540	2	318	6	162	43,275	-----	14
50 to 99.....	51	3,307	915,689	1	259	2	149	45,660	-----	18
100 or more.....	15	2,104	666,253	-----	131	10	3,290	945,929	2	237
Total.....	925	12,874	3,409,156	8	1,287	38	3,735	1,067,365	2	281
In and about quarry:										
1 to 9.....	51	287	51,140	1	55	570	2,821	528,491	5	445
10 to 24.....	57	844	181,449	4	165	527	8,079	1,760,386	19	1,187
25 to 49.....	18	581	128,746	2	91	259	8,627	1,931,493	20	1,043
50 to 99.....	7	452	95,563	3	52	133	8,731	2,027,277	16	962
100 or more.....	1	112	24,080	-----	3	66	10,815	2,752,803	14	1,015
Total.....	134	2,276	480,978	10	366	1,555	39,073	9,000,450	74	4,652
In outside works:										
1 to 9.....	106	420	89,482	2	38	945	3,796	815,526	6	334
10 to 24.....	29	413	82,286	1	44	317	4,648	1,088,247	5	511
25 to 49.....	5	170	38,840	-----	6	141	4,660	1,185,365	2	576
50 to 99.....	3	162	44,373	-----	8	100	6,861	1,883,738	4	570
100 or more.....	-----	-----	-----	-----	-----	112	21,595	6,586,046	14	774
Total.....	143	1,165	254,981	3	96	1,615	41,560	11,558,922	31	2,765

TABLE 47.—Comparison of injury rates at large and at small quarries, during the year ended December 31, 1930¹

[Inside only]

Men employed	1930								1929		
	Number of plants	Men employed		Days of labor per- formed	Average days active	Killed	Injured	Killed per thousand 300-day workers	Injured per thou- sand 300-day work- ers	Fatality rate	Injury rate
		Actual num- ber	Equivalent in 300-day workers								
ALL QUARRIES											
1 to 4.....	258	723	398	119,197	165	1	92	2.51	231.16	-----	141.51
5 to 9.....	312	2,098	1,364	409,294	195	4	353	2.93	258.80	2.11	228.71
10 to 14.....	249	2,900	2,066	619,853	214	11	464	5.32	224.59	4.73	268.28
15 to 19.....	148	2,422	1,776	532,864	220	2	345	1.13	194.26	2.95	243.99
20 to 24.....	130	2,757	2,025	607,669	220	6	378	2.96	186.67	2.31	186.35
1 to 24.....	1,097	10,900	7,629	2,288,877	210	24	1,632	3.15	213.92	2.93	227.02
25 to 49.....	259	8,627	6,438	1,931,493	224	20	1,043	3.11	162.01	2.83	198.82
50 to 99.....	133	8,731	6,758	2,027,277	232	16	962	2.37	142.35	2.02	163.19
100 or more.....	66	10,815	9,176	2,752,803	255	14	1,015	1.53	110.61	1.27	120.62
25 to 100 or more.....	458	28,173	22,372	6,711,573	238	50	3,020	2.23	134.99	1.97	157.17
Total.....	1,555	39,073	30,001	9,000,450	230	74	4,652	2.47	155.06	2.18	172.48
DIMENSION-STONE QUARRIES											
1 to 4.....	100	273	157	47,221	173	-----	26	-----	165.61	-----	126.98
5 to 9.....	96	647	443	133,005	206	1	117	2.26	264.11	-----	188.44
10 to 14.....	58	660	496	148,738	225	1	79	2.02	159.27	-----	283.05
15 to 19.....	28	456	326	97,772	214	-----	71	-----	217.79	-----	284.93
20 to 24.....	34	721	525	157,506	218	2	91	3.81	173.33	3.44	278.35
1 to 24.....	316	2,757	1,947	584,242	212	4	384	2.05	197.23	.58	249.27
25 to 49.....	54	1,751	1,395	418,554	239	5	230	3.58	164.87	4.71	202.72
50 to 99.....	31	2,133	1,642	492,460	231	3	227	1.83	138.25	1.49	156.72
100 or more.....	25	4,115	3,575	1,072,475	261	8	450	2.24	125.87	.24	126.91
25 to 100 or more.....	110	7,999	6,612	1,983,489	248	16	907	2.42	137.17	1.60	152.17
Total.....	426	10,756	8,559	2,567,731	239	20	1,291	2.34	150.84	1.43	169.14
NONDIMENSION-STONE QUARRIES											
1 to 4.....	138	388	208	62,370	161	-----	48	-----	230.77	-----	151.16
5 to 9.....	186	1,252	787	236,092	189	3	197	3.81	250.32	3.62	246.08
10 to 14.....	158	1,852	1,294	388,105	210	8	307	6.18	237.25	7.84	271.78
15 to 19.....	105	1,717	1,259	377,809	220	2	231	1.59	183.48	4.17	240.44
20 to 24.....	86	1,822	1,357	407,209	223	1	251	.74	184.97	2.61	155.05
1 to 24.....	673	7,031	4,905	1,471,585	209	14	1,034	2.85	210.81	4.29	219.79
25 to 49.....	179	5,954	4,371	1,311,357	220	15	666	3.43	152.37	2.29	200.78
50 to 99.....	89	5,746	4,388	1,316,395	229	12	628	2.73	143.12	1.98	155.10
100 or more.....	36	6,100	5,162	1,548,533	254	6	536	1.16	103.84	1.96	132.36
25 to 100 or more.....	304	17,800	13,921	4,176,285	235	33	1,830	2.37	131.46	2.08	162.92
Total.....	977	24,831	18,826	5,647,870	227	47	2,864	2.50	152.13	2.59	176.18

¹ Exclusive of crushers and other outside works. Dimension-stone and nondimension-stone quarries will not equal total quarries, because of a small number that were "no stated" as to kind of quarrying stone produced.

TABLE 48.—All quarries: Accident data, based on average number of days quarries were operated by employees inside the quarry, during the year ended December 31, 1930

Average number of days	Number of plants	Men employed		Average employees per plant	Days of labor performed	Killed	Injured	Killed per thousand 300-day workers	Injured per thousand 300-day workers
		Actual number	Equivalent in 300-day workers						
300 days or more.....	254	7, 525	7, 782	30	2, 334, 598	12	1, 027	1. 54	131. 97
250 to 299 days.....	337	11, 360	10, 173	34	3, 051, 870	15	1, 470	1. 47	144. 50
200 to 249 days.....	346	9, 468	7, 003	27	2, 101, 089	26	1, 135	3. 71	162. 07
150 to 199 days.....	267	6, 143	3, 549	23	1, 064, 734	9	625	2. 54	176. 11
100 to 149 days.....	166	2, 793	1, 138	17	341, 454	6	290	5. 27	254. 83
50 to 99 days.....	115	1, 215	304	11	91, 165	5	79	16. 45	259. 87
Less than 50 days.....	70	569	52	8	15, 540	1	26	19. 23	500. 00
Total.....	1, 555	39, 073	30, 001	25	9, 000, 450	74	4, 652	2. 47	155. 0
150 days or more.....	1, 204	34, 496	28, 507	29	8, 552, 291	62	4, 257	2. 17	149. 3 3
149 days or less.....	351	4, 577	1, 494	13	448, 159	12	395	8. 04	264. 39
DIMENSION STONE									
150 days or more.....	337	9, 871	8, 281	29	2, 484, 287	17	1, 219	2. 05	147. 20
149 days or less.....	89	885	278	10	83, 444	3	72	10. 79	258. 99
NONDIMENSION STONE									
150 days or more.....	748	21, 620	17, 783	29	5, 334, 906	41	2, 579	2. 31	145. 03
149 days or less.....	229	3, 211	1, 043	14	312, 964	6	285	5. 75	273. 25
ALL OTHER AND NOT STATED									
150 days or more.....	119	3, 005	2, 444	25	733, 098	4	459	1. 64	187. 8 1
149 days or less.....	33	481	172	15	51, 7 1	3	38	17. 44	220. 9 3

TABLE 50.—All quarries: Labor and accident data, classified by severity of injuries, during the year ended December 31, 1930
[Inside only]

Severity of injury	Num-ber of plants	Men employed		Days of labor per-formed	Killed	Nonfatal				Killed and injured per thousand 300-day workers								
		Actual num-ber	Equiv-alent in 300-day work-ers			Per-ma-nent total ¹	Per-ma-nent par-tial ²	Tem-porary ³	Total	Killed	Nonfatal							
											Per-ma-nent total	Per-ma-nent par-tial	Tem-porary	Total				
Dimension stone:																		
No lost-time injuries.....	196	2,228	1,629	488,609														
Temporary injuries only.....	184	5,059	3,956	1,186,936			813	246	281						205.51	205.51		
Temporary and permanent partial injuries.....	30	2,030	1,732	519,621			35								20.21	142.03		162.24
Temporary, permanent partial, and permanent total injuries.....																		
Temporary, permanent partial, permanent total injuries, and fatalities.....	16	1,439	1,242	372,565	20	1	7	189	217	16.10	0.81	5.64	152.17	174.72				
Total.....	426	10,756	8,559	2,567,731	20	1	42	1,248	1,311	2.34	0.11	4.91	145.81	153.17				
Non-dimension stone:																		
No lost-time injuries.....	439	6,978	4,894	1,468,278														
Temporary injuries only.....	440	12,441	9,571	2,871,264														
Temporary and permanent partial injuries.....	59	2,598	2,086	625,685			75	279	354									
Temporary, permanent partial, and permanent total injuries.....																		
Temporary, permanent partial, permanent total injuries, and fatalities.....	2	104	91	27,304			7	11	39						76.92	120.88	230.77	428.57
Total.....	37	2,710	2,184	655,339	47	1	17	408	473	21.53	.46	7.79	186.81	216.93				
Total.....	977	24,831	18,826	5,647,870	47	8	103	2,753	2,911	2.50	.43	5.47	146.23	154.63				

¹ Permanent total disability: Loss of both legs or arms, one leg and one arm, total loss of eyesight, paralysis, or other condition permanently incapacitating workman from doing any work of a gainful occupation.
² Permanent partial disability: Loss of one foot, leg, hand, eye, one or more fingers, one or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.
³ Disability for more than remainder of day of accident.

TABLE 51.—Accident data, based on number of employees inside the quarries and number of days plants were active during the year ended December 31, 1930

Men employed	1 to 99 days						100 to 199 days						200 to 299 days						300 or more days						Total					
	Number of plants	Men employed	Days of labor per- formed	Killed	Injured	Number of plants	Men employed	Days of labor per- formed	Killed	Injured	Number of plants	Men employed	Days of labor per- formed	Killed	Injured	Number of plants	Men employed	Days of labor per- formed	Killed	Injured	Number of plants	Men employed	Days of labor per- formed	Killed	Injured					
DIMENSION STONE																														
1 to 14.....	45	177,110,942	5	70	431	65,834	1	61	97	670	160,896	93	42	302	91,292	1	63	254	1,580	328,964	2	222								
15 to 49.....	5	115,5632	1	6	28	100,856	1	60	65	1,696	413,086	5	255	18	510	154,258	1	71	116	2,928	673,832	7	382							
50 or more.....	1	65	3	10	774	125,413	1	75	34	3,767	936,754	7	469	11	1,642	502,443	3	130	56	6,248	1,564,935	11	677							
Total.....	51	357,16,899	1	14	1,081	292,103	2	196	196	6,133	1,510,736	12	817	71	2,454	747,993	5	264	426	10,756	2,567,731	20	1,291							
NONDIMENSION STONE																														
1 to 14.....	89	485,27,061	32	152	1,071	159,148	4	174	179	1,453	350,920	7	251	62	483	149,438	---	95	482	3,492	686,567	11	552							
15 to 49.....	26	698,45,375	3	49	107	435,779	2	309	165	4,207	1,031,471	9	492	72	1,845	583,750	4	298	370	9,493	2,096,375	18	1,148							
50 or more.....	2	112,10,059	1	29	2,516	397,540	6	183	68	6,974	1,759,142	9	691	26	2,244	698,187	3	289	125	11,846	2,864,928	18	1,164							
Total.....	117	1,295,82,495	3	82	2,888	6,330	992,467	12	666	412	12,634	3,141,533	25	1,434	160	4,572	1,431,375	7	682	977	24,831	5,647,870	47	2,864						

TABLE 52.—Accident data, based on number of employees inside the quarries and number of hours of exposure during the year ended December 31, 1930

Men employed	8 hours						9 hours						10 hours						All other and not stated						Total																																	
	Number of plants	Men employed	Days of labor per- formed	Killed	Injured	Number of plants	Men employed	Days of labor per- formed	Killed	Injured	Number of plants	Men employed	Days of labor per- formed	Killed	Injured	Number of plants	Men employed	Days of labor per- formed	Killed	Injured	Number of plants	Men employed	Days of labor per- formed	Killed	Injured	Number of plants	Men employed	Days of labor per- formed	Killed	Injured																												
DIMENSION STONE																																																										
1 to 14.....	127	749	159, 985	106	473	71	473	68, 987	2	66	25	189	32, 696	1	19	31	169	37, 326	---	31	254	1, 580	328, 964	2	222	49	116	2, 928	673, 832	7	302	15	1, 544	374, 371	200	14	1, 764	491, 400	3	162	19	2, 217	522, 255	6	267	8	723	171, 909	2	48	56	6, 248	1, 564, 835	11	677			
15 to 49.....	52	1, 361	314, 373	4	28	28	670	165, 364	2	92	26	649	137, 834	1	78	10	248	56, 041	---	49	116	2, 928	673, 832	7	302	49	116	2, 928	673, 832	7	302	49	116	2, 928	673, 832	7	302	49	116	2, 928	673, 832	7	302	49	116	2, 928	673, 832	7	302									
50 or more.....	15	1, 544	374, 371	200	14	1, 764	491, 400	3	162	19	2, 217	522, 255	6	267	8	723	171, 909	2	48	56	6, 248	1, 564, 835	11	677	49	116	2, 928	673, 832	7	302	49	116	2, 928	673, 832	7	302	49	116	2, 928	673, 832	7	302	49	116	2, 928	673, 832	7	302										
Total.....	194	3, 654	853, 729	4	479	113	2, 907	755, 971	7	320	70	3, 055	692, 755	7	364	49	1, 140	295, 276	2	128	426	10, 756	2, 567, 731	20	1, 291	49	116	2, 928	673, 832	7	302	49	116	2, 928	673, 832	7	302	49	116	2, 928	673, 832	7	302	49	116	2, 928	673, 832	7	302									
NONDIMENSION STONE																																																										
1 to 14.....	135	897	166, 711	2	114	125	691	191, 573	2	172	168	1, 264	242, 545	6	224	54	400	85, 738	1	42	482	3, 492	686, 567	11	552	6	150	370	9, 493	2, 006, 375	18	1, 148	80	2, 019	453, 088	7	454	21	1, 931	468, 083	3	206	43	3, 217	768, 843	5	361	465	50	1, 332	306, 633	6	150	370	9, 493	2, 006, 375	18	1, 148
15 to 49.....	40	4, 326	1, 021, 643	7	454	21	1, 931	468, 083	3	206	43	3, 217	768, 843	5	361	21	2, 372	606, 355	3	143	125	11, 846	2, 864, 928	18	1, 164	6	150	370	9, 493	2, 006, 375	18	1, 148	80	2, 019	453, 088	7	454	21	1, 931	468, 083	3	206	43	3, 217	768, 843	5	361	465	50	1, 332	306, 633	6	150	370	9, 493	2, 006, 375	18	1, 148
50 or more.....	40	4, 326	1, 021, 643	7	454	21	1, 931	468, 083	3	206	43	3, 217	768, 843	5	361	21	2, 372	606, 355	3	143	125	11, 846	2, 864, 928	18	1, 164	6	150	370	9, 493	2, 006, 375	18	1, 148	80	2, 019	453, 088	7	454	21	1, 931	468, 083	3	206	43	3, 217	768, 843	5	361	465	50	1, 332	306, 633	6	150	370	9, 493	2, 006, 375	18	1, 148
Total.....	255	7, 242	1, 643, 444	13	767	235	5, 035	1, 162, 300	7	712	362	8, 450	1, 643, 310	17	1, 050	125	4, 104	998, 726	10	335	977	24, 831	5, 647, 870	47	2, 864	10	335	977	24, 831	5, 647, 870	47	2, 864	10	335	977	24, 831	5, 647, 870	47	2, 864	10	335	977	24, 831	5, 647, 870	47	2, 864												

ACCIDENT RATES FOR CEMENT MILLS

In the bureau's canvass of accidents in the quarry industry in 1925 special effort was made to obtain reports covering cement mills. Returns for earlier years seemed to be incomplete for plants engaged in the manufacture of cement, although the bureau's report form specifically requested information from the mills. Since 1925 the bureau has continued its effort to obtain reports from all cement mills, and it is believed that the returns for the most recent years are fairly complete. The results of the canvass are shown in Table 53. The accident-frequency rates have shown a decidedly downward trend during the six years ending with 1930.

According to the returns from selected producing companies, 11,664 men were employed at cement mills in 1930. This number includes the employees at crushing plants but not those inside the quarry pits. The operating time for all mills was 3,549,347 man-days or shifts, an average of 304 shifts per man.

Accidents caused 8 deaths and 230 nonfatal lost-time injuries, indicating a death rate of 0.68 and an injury rate of 19.44 per thousand 300-day workers. Figures for each of the principal cement-manufacturing States are given in Table 53.

TABLE 53.—Selected plants: Accident rates, men employed, etc., at cement mills (including crushers) during the year ended December 31, 1930

State	Men employed		Days of labor per- formed	Average days active	Killed	Permanent total	Permanent partial	Temporary	Total nonfatal	Killed per thou- sand 300-day workers	Injured per thou- sand 300-day workers
	Actual num- ber	Equivalent in 300-day workers									
California.....	984	1,085	325,392	331	1	---	---	54	54	0.92	49.77
Illinois.....	1,115	1,201	360,261	323	2	---	1	1	2	1.67	1.67
Kansas.....	539	498	149,319	277	---	---	---	1	1	---	2.01
New York.....	728	798	239,485	329	---	---	1	6	7	---	8.77
Ohio.....	727	751	225,411	310	---	---	1	3	4	---	5.33
Pennsylvania.....	2,899	2,903	870,848	300	1	---	1	8	9	.34	3.10
Not segregated.....	4,672	4,595	1,378,631	295	4	---	8	145	153	.87	33.30
Total, 1930.....	11,664	11,831	3,549,347	304	8	---	12	218	230	.68	19.44

TABLE 54.—Fatalities and injuries, classified by character of disability, for the 5-year period 1926 to 1930

Character of disability, 5-year period	In and about quarry															
	Falls or slides of rock or overburden	Handling materials	Timber or hand tools	Explosives	Haulage	Falls of persons	Falling objects (other than 1 and 2)	Flying objects	Electricity	Drilling and channeling (by machine or hand)	Machinery	Nails, splinters, etc.	Boiler and air-tank explosions	Burns	Other causes	Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Killed: 1926-1930.....	142	15	1	81	55	37	15	10	18	6	36	---	11	2	9	438
Permanent total: 1926-1930.....	2	6	2	8	4	2	3	1	---	---	11	---	---	---	---	39
Permanent partial: 1926-1930.....	118	114	14	109	155	61	44	166	6	55	152	9	---	4	40	1,047
Temporary: 1926-1930.....	3,169	6,828	1,242	898	2,864	1,876	1,729	4,423	139	1,499	2,561	704	15	462	3,648	32,057
Total injured: 1926-1930.....	3,289	6,948	1,258	1,015	3,023	1,939	1,776	4,590	145	1,554	2,724	713	15	466	3,688	33,143
Total killed and injured: 1926-1930.....	3,431	6,963	1,259	1,096	3,078	1,976	1,791	4,600	163	1,560	2,760	713	26	468	3,697	33,581

Character of disability, 5-year period	In outside works											Total	Grand total
	Haulage	Machinery	Hand tools	Nails, splinters, etc.	Electricity	Falls of persons	Falling objects (rocks, timbers, etc.)	Flying objects	Handling materials	Burns	Other causes		
	16	17	18	19	20	21	22	23	24	25	26		
Killed: 1926-1930.....	36	60	1	---	17	24	19	5	2	17	20	201	639
Permanent total: 1926-1930.....	3	2	---	---	---	2	1	1	2	1	1	13	52
Permanent partial: 1926-1930.....	60	210	23	4	7	48	51	92	45	20	63	623	1,670
Temporary: 1926-1930.....	1,399	2,410	1,525	761	245	2,032	2,183	3,637	2,222	1,160	3,102	20,676	52,733
Total injured: 1926-1930.....	1,462	2,622	1,548	765	252	2,082	2,235	3,730	2,269	1,181	3,166	21,312	54,455
Total killed and injured: 1926-1930.....	1,498	2,682	1,549	765	269	2,106	2,254	3,735	2,271	1,198	3,186	21,513	55,094

TABLE 55.—All quarries: Severity of accidents, by causes, 1926 to 1930, showing percentage of accidents in each degree of severity

Cause	Per cent					Number killed	Number injured
	Killed	Nonfatal					
		Perma- nent total	Perma- nent partial	Tem- porary	Total non- fatal		
In and about quarry:							
1. Falls or slides of rock or overburden.....	4.14	0.06	3.44	92.36	95.86	142	3,289
2. Handling materials.....	.22	.08	1.64	98.06	99.78	15	6,948
3. Timber or hand tools.....	.08	.16	1.11	98.65	99.92	1	1,258
4. Explosives.....	7.39	.73	9.95	81.93	92.61	81	1,015
5. Haulage.....	1.79	.13	5.03	93.05	98.21	55	3,023
6. Falls of persons.....	1.87	.10	3.09	94.94	98.13	37	1,939
7. Falling objects (other than 1 and 2)....	.84	.17	2.45	96.54	99.16	15	1,776
8. Flying objects.....	.22	.02	3.61	96.15	99.78	10	4,590
9. Electricity.....	11.04	-----	3.68	85.28	88.96	18	1,145
10. Drilling and channeling (by machine or hand).....	.38	-----	3.53	96.09	99.62	6	1,554
11. Machinery.....	1.30	.40	5.51	92.79	98.70	36	2,724
12. Nails, splinters, etc.....	-----	-----	1.26	98.74	100.00	-----	713
13. Boiler and air-tank explosions.....	42.31	-----	-----	57.69	57.69	11	15
14. Burns.....	.43	-----	.85	98.72	99.57	2	466
15. Other causes.....	.24	-----	1.08	98.68	99.76	9	3,688
Total.....	1.30	.12	3.12	95.46	98.70	438	33,143
Outside works:							
16. Haulage.....	2.40	.20	4.01	93.39	97.60	36	1,462
17. Machinery.....	2.24	.07	7.83	89.86	97.76	60	2,622
18. Hand tools.....	.06	-----	1.49	98.45	99.94	1	1,548
19. Nails, splinters, etc.....	-----	-----	.52	99.48	100.00	-----	765
20. Electricity.....	6.32	-----	2.60	91.08	93.68	17	252
21. Falls of persons.....	1.14	.09	2.28	96.49	98.86	24	2,082
22. Falling objects (rocks, timbers, etc.)....	.84	.05	2.26	96.85	99.16	19	2,235
23. Flying objects.....	.13	.03	2.46	97.38	99.87	5	3,730
24. Handling materials.....	.09	.09	1.98	97.84	99.91	2	2,269
25. Burns.....	1.42	.08	1.67	96.83	98.58	17	1,181
26. Other causes.....	.63	.03	1.98	97.36	99.37	20	3,166
Total.....	.93	.06	2.90	96.11	99.07	201	21,312
Grand total.....	1.16	.09	3.03	95.72	98.84	639	54,455

TIME LOST THROUGH QUARRY ACCIDENTS

The reports that quarry operators send to the Bureau of Mines at the close of each calendar year do not show the amount of time lost as a result of each individual accident, but they do classify the accidents into four main groups based upon the severity of the injuries. This classification shows the number of fatalities, permanent total disabilities, permanent partial disabilities, and temporary disability for more than the remainder of the day on which the accident occurred.

Special studies, based upon more detailed information concerning accidents at certain mines and quarries that have been cooperating with the Bureau of Mines in an intensive study of accidents, have indicated that temporary injuries cause an average loss of 10 days each.

With this information, it is possible to estimate the loss of time represented by the temporary injuries reported to the bureau annually by quarry companies. Fatal accidents and nonfatal injuries causing total disability of a permanent nature are weighted at 6,000 lost days each, in accordance with the recommendation of the International Association of Industrial Accident Boards and Commissions. Permanent partial disabilities are weighted at 800 lost days each, pending the accumulation of a large enough number of reports of such injuries in connection with the bureau's special study of quarry accidents.

On the above basis it is estimated that the 105 fatalities and 7,417 injuries in the quarrying and related industries, during the year under

consideration, represented a loss of time or period of disability equal in man-days to—

	Lost days
105 fatalities, at 6,000 lost days each.....	630,000
12 permanent total disabilities, at 6,000 lost days each.....	72,000
253 permanent partial disabilities, at 800 lost days each.....	202,400
7,152 temporary disabilities at 10 lost days each.....	71,520
Total, 7,522.....	975,920

The foregoing figures indicate that each accident in 1930 represented a loss of 130 days and that the estimated loss of time from all accidents was equal to 4.7 days for every 100 man-shifts worked by all employees.

SUMMARY OF QUARRY STATISTICS

Tables 56 to 63 summarize accident and labor data for the quarry industry in the United States for the two half decades 1917 to 1921 and for 1922 to 1926. The figures have been classified by States, so that the situation in any given State may readily be seen. Table 64 presents similar data for the United States as a whole, for each of the chief kinds of quarries by years since 1921.

TABLE 56.—All quarries: Average number of men employed, by States, during the half decades ending 1921 and 1926 and during the year ended December 31, 1930

State	In and about quarry			In outside works			Total		
	Total, 1917-1921	Total, 1922-1926	1930	Total, 1917-1921	Total, 1922-1926	1930	Total, 1917-1921	Total, 1922-1926	1930
Alabama.....	6,514	6,721	925	2,635	3,229	1,237	9,149	9,950	2,162
Arkansas.....	1,259	1,067	336	337	339	87	1,596	1,406	423
California.....	7,734	11,840	1,577	9,946	16,908	2,375	17,680	28,748	3,952
Colorado.....	2,267	3,060	308	958	2,037	325	3,225	5,097	633
Connecticut.....	2,378	3,056	444	668	956	223	3,046	4,012	667
Georgia.....	3,860	6,699	904	3,280	7,283	1,584	7,140	13,982	2,488
Illinois.....	10,522	13,024	2,013	6,413	8,439	1,710	16,935	21,463	3,723
Indiana.....	12,138	15,737	2,216	6,722	10,924	2,880	18,860	26,661	5,096
Iowa.....	2,697	2,287	586	2,033	3,353	1,032	4,730	5,640	1,618
Kansas.....	3,490	2,962	523	3,417	3,628	811	6,907	6,590	1,334
Kentucky.....	5,271	5,070	736	995	1,320	518	6,266	6,390	1,254
Maine.....	3,809	5,281	906	3,642	3,823	834	7,451	9,104	1,740
Maryland.....	5,924	3,993	563	4,023	3,296	587	9,947	7,289	1,150
Massachusetts.....	8,165	7,920	1,021	4,433	5,836	1,047	12,598	13,756	2,068
Michigan.....	5,475	5,863	933	3,063	5,297	1,317	8,538	11,160	2,250
Minnesota.....	4,359	4,069	587	2,508	3,028	856	6,867	7,097	1,443
Missouri.....	10,247	11,964	1,846	4,056	5,798	1,236	14,303	17,762	3,082
New Hampshire.....	2,630	2,436	260	1,162	1,209	405	3,792	3,645	665
New Jersey.....	6,616	6,100	821	3,085	3,275	887	9,701	9,375	1,708
New Mexico.....	1,301	932	84	276	298	17	1,577	1,230	101
New York.....	13,398	13,117	2,221	7,393	7,756	2,210	20,791	20,873	4,431
North Carolina.....	4,451	5,328	720	1,913	2,455	563	6,364	7,783	1,283
Ohio.....	17,173	20,113	2,748	7,424	12,475	2,737	24,597	32,588	5,485
Oklahoma.....	2,695	2,924	424	2,089	1,580	577	4,784	4,504	1,001
Pennsylvania.....	52,902	51,223	6,482	29,662	33,105	7,265	82,564	84,328	13,747
Rhode Island.....	1,176	1,097	77	1,117	495	76	2,293	1,592	153
Tennessee.....	5,778	7,431	1,640	1,680	3,534	1,309	7,458	10,965	2,949
Texas.....	3,616	4,078	669	4,181	5,166	1,330	7,797	9,244	1,999
Utah.....	1,193	1,779	301	580	831	110	1,773	2,610	411
Vermont.....	11,742	12,587	1,846	9,907	9,826	2,019	21,649	22,413	3,865
Virginia.....	6,746	6,971	1,127	2,587	3,985	758	9,333	10,956	1,885
Washington.....	1,615	1,068	256	766	970	463	2,381	2,038	719
West Virginia.....	5,787	6,485	1,221	2,508	2,901	457	8,295	9,386	1,678
Wisconsin.....	8,269	7,191	885	2,823	2,967	643	11,092	10,158	1,528
Not segregated.....	6,425	6,212	867	1,896	2,789	1,075	8,321	9,001	1,942
Total.....	249,622	267,685	39,073	140,178	181,111	41,560	389,800	448,796	80,633

TABLE 57.—All quarries: Number of 300-day workers employed, by States, during the half decades ending 1921 and 1926 and during the year ended December 31, 1930

State	In and about quarry			In outside works			Total		
	Total, 1917-1921	Total, 1922-1926	1930	Total, 1917-1921	Total, 1922-1926	1930	Total, 1917-1921	Total, 1922-1926	1930
Alabama.....	5,424	6,336	692	2,552	3,347	1,237	7,976	9,683	1,929
Arkansas.....	868	722	232	251	309	77	1,149	1,031	309
California.....	7,298	11,069	1,278	10,397	18,908	2,328	17,695	29,977	3,606
Colorado.....	1,917	2,648	185	947	1,978	266	2,864	4,626	451
Connecticut.....	1,878	2,458	387	584	834	207	2,462	3,292	594
Georgia.....	3,304	6,043	742	3,241	7,150	1,489	6,545	13,193	2,231
Illinois.....	8,283	10,653	1,660	5,979	8,435	1,679	14,262	19,088	3,339
Indiana.....	9,648	14,224	1,687	5,965	9,679	2,551	15,613	23,903	4,238
Iowa.....	2,020	1,715	478	1,958	3,306	1,133	3,978	5,021	1,611
Kansas.....	2,654	2,219	404	3,140	3,579	792	5,794	5,798	1,196
Kentucky.....	3,445	3,443	516	720	942	493	4,165	4,355	1,009
Maine.....	3,119	4,325	697	3,489	3,950	789	6,608	8,275	1,486
Maryland.....	5,144	3,200	432	3,736	3,453	496	8,880	6,743	928
Massachusetts.....	6,381	6,426	741	3,651	5,430	874	10,032	11,856	1,615
Michigan.....	4,428	4,591	808	2,425	5,002	1,337	6,853	9,593	2,145
Minnesota.....	3,251	3,354	445	1,545	2,568	772	4,796	5,922	1,217
Missouri.....	9,069	10,281	1,394	3,856	5,837	1,196	12,955	16,118	2,590
New Hampshire.....	1,997	1,980	206	989	1,005	356	2,986	2,985	562
New Jersey.....	5,080	4,930	603	2,653	3,189	735	7,733	8,119	1,338
New Mexico.....	641	556	33	116	201	7	757	757	40
New York.....	9,885	9,694	1,617	6,101	6,801	2,046	15,986	16,495	3,663
North Carolina.....	3,616	4,507	467	1,626	2,289	474	5,242	6,796	941
Ohio.....	14,208	17,417	2,185	6,268	11,784	2,527	20,476	29,201	4,712
Oklahoma.....	2,143	2,483	377	2,044	1,629	652	4,187	4,112	1,029
Pennsylvania.....	43,834	44,182	4,833	27,925	32,734	6,609	71,759	76,016	11,442
Rhode Island.....	1,032	948	66	1,095	416	75	2,127	1,364	141
Tennessee.....	4,721	6,657	1,230	1,458	3,627	1,136	6,179	10,284	2,366
Texas.....	3,164	3,593	518	4,052	5,520	1,251	7,216	9,113	1,769
Utah.....	1,041	1,371	181	577	775	93	1,618	2,146	274
Vermont.....	10,427	12,009	1,677	9,725	9,913	1,883	20,152	21,922	3,560
Virginia.....	5,545	6,147	875	2,333	3,841	668	7,878	9,988	1,543
Washington.....	1,233	930	205	660	923	400	1,893	1,853	605
West Virginia.....	5,072	5,567	860	2,216	2,739	385	7,288	8,306	1,245
Wisconsin.....	6,530	5,892	658	2,362	2,542	517	8,892	8,434	1,175
Not segregated.....	5,168	4,831	632	1,487	2,162	1,000	6,655	6,993	1,632
Total.....	203,468	227,491	30,001	128,183	176,797	38,530	331,651	404,288	68,631

QUARRY ACCIDENTS IN THE UNITED STATES, 1930

TABLE 58.—All quarries: Days of labor performed, during the half decades ending 1921 and 1926 and during the year ended December 31, 1930

State	In and about quarry			In outside works			Total		
	Total, 1917-1921	Total, 1922-1926	1930	Total, 1917-1921	Total, 1922-1926	1930	Total, 1917-1921	Total, 1922-1926	1930
Alabama	1, 627, 390	1, 900, 811	207, 716	765, 541	1, 004, 180	370, 958	2, 392, 931	2, 904, 991	578, 674
Arkansas	216, 491	216, 491	69, 607	84, 331	92, 532	23, 027	344, 663	369, 073	92, 634
California	2, 189, 442	3, 320, 406	383, 437	3, 119, 185	5, 672, 363	698, 345	5, 308, 627	8, 992, 769	1, 081, 782
Colorado	575, 077	794, 224	55, 408	283, 783	593, 616	79, 799	858, 860	1, 387, 840	1, 385, 207
Connecticut	563, 445	116, 210	175, 298	175, 298	250, 345	61, 953	738, 743	987, 928	178, 163
Georgia	991, 089	1, 812, 787	222, 662	972, 354	2, 145, 226	446, 536	1, 963, 443	3, 958, 013	669, 198
Illinois	2, 484, 725	3, 195, 782	497, 982	1, 793, 813	2, 530, 445	503, 816	4, 278, 538	5, 726, 227	1, 001, 798
Indiana	2, 894, 601	4, 267, 030	506, 024	1, 789, 240	2, 903, 676	765, 467	4, 683, 841	7, 170, 706	1, 271, 491
Iowa	606, 573	514, 359	143, 518	486, 907	991, 638	339, 824	1, 193, 480	1, 505, 997	463, 342
Kansas	796, 486	665, 835	121, 091	941, 767	1, 073, 883	237, 578	1, 738, 253	1, 739, 718	358, 669
Kentucky	1, 033, 264	1, 032, 836	154, 670	216, 350	282, 980	148, 104	1, 249, 614	1, 315, 816	302, 774
Maine	935, 532	1, 297, 779	209, 037	1, 046, 801	1, 184, 983	236, 899	1, 982, 333	2, 482, 712	446, 936
Maryland	1, 543, 660	986, 774	129, 749	1, 120, 459	1, 036, 011	148, 732	2, 664, 119	2, 022, 785	278, 481
Massachusetts	1, 914, 568	1, 927, 851	222, 200	1, 095, 207	1, 628, 837	262, 418	3, 009, 765	3, 556, 688	484, 618
Michigan	1, 327, 837	1, 377, 363	242, 377	728, 014	1, 500, 691	401, 134	2, 055, 871	2, 878, 054	643, 511
Minnesota	975, 290	1, 006, 252	133, 593	463, 296	770, 457	231, 509	1, 438, 535	1, 776, 700	365, 102
Missouri	2, 721, 015	3, 084, 022	418, 089	1, 165, 599	1, 751, 331	358, 804	3, 886, 614	4, 895, 333	776, 893
New Hampshire	598, 953	594, 326	61, 902	296, 838	301, 287	106, 882	895, 791	895, 802	168, 584
New Jersey	1, 524, 415	1, 479, 204	180, 890	795, 530	956, 598	220, 534	2, 319, 945	2, 435, 802	401, 424
New Mexico	192, 530	166, 740	9, 906	34, 614	60, 379	2, 050	227, 144	227, 119	11, 956
New York	2, 965, 338	2, 908, 393	485, 154	1, 830, 575	2, 040, 036	613, 006	4, 755, 913	4, 948, 429	1, 098, 760
North Carolina	1, 084, 733	1, 352, 084	139, 958	487, 645	686, 816	142, 190	1, 572, 378	2, 088, 900	282, 148
Ohio	4, 262, 344	5, 225, 410	655, 590	1, 880, 324	3, 534, 915	758, 050	6, 142, 668	8, 760, 325	1, 413, 612
Oklahoma	642, 887	745, 041	113, 018	613, 104	488, 728	195, 094	1, 255, 991	1, 233, 769	308, 712
Pennsylvania	13, 150, 557	13, 254, 731	1, 449, 869	8, 377, 517	9, 819, 701	1, 982, 870	21, 528, 074	23, 074, 432	3, 432, 739
Rhode Island	309, 687	284, 536	19, 739	328, 331	124, 738	22, 548	638, 018	409, 294	42, 287
Tennessee	1, 416, 378	1, 997, 203	368, 034	437, 552	1, 088, 216	340, 774	1, 853, 930	3, 085, 419	709, 708
Texas	949, 001	1, 077, 917	155, 532	1, 215, 810	1, 656, 012	871, 515	2, 433, 969	5, 000, 712	1, 167, 000
Utah	312, 598	411, 072	54, 301	172, 701	232, 492	27, 804	485, 299	643, 567	82, 105
Vermont	3, 127, 528	3, 692, 381	502, 955	2, 917, 694	2, 974, 186	568, 096	6, 045, 222	6, 576, 567	1, 068, 051
Virginia	1, 664, 048	1, 844, 152	262, 520	699, 598	1, 152, 194	200, 255	2, 363, 646	2, 996, 346	462, 775
Washington	369, 994	279, 394	61, 696	198, 018	276, 514	119, 940	568, 012	555, 908	181, 606
West Virginia	1, 521, 224	1, 670, 233	257, 979	665, 051	821, 565	115, 529	2, 186, 275	2, 491, 798	373, 598
Wisconsin	1, 958, 953	1, 767, 486	197, 477	708, 686	762, 769	155, 158	2, 667, 639	2, 530, 255	352, 636
Not segregated	1, 549, 033	1, 448, 755	189, 660	447, 345	648, 804	300, 059	1, 996, 378	2, 097, 559	469, 719
Total	61, 040, 486	68, 247, 243	9, 000, 450	38, 454, 878	63, 089, 167	11, 558, 922	99, 495, 364	121, 266, 410	20, 589, 372

TABLE 59.—All quarries: Average number of days quarries were operated, by States, during the half decades ending 1921 and 1926 and during the year ended December 31, 1930

State	In and about quarry			In outside works			Total		
	Total, 1917-1921	Total, 1922-1926	1930	Total, 1917-1921	Total, 1922-1926	1930	Total, 1917-1921	Total, 1922-1926	1930
Alabama.....	250	283	225	291	311	300	262	292	268
Arkansas.....	207	203	207	250	273	265	216	220	219
California.....	283	280	243	314	335	294	300	313	274
Colorado.....	254	260	180	296	291	246	266	272	214
Connecticut.....	237	241	262	262	262	278	243	246	267
Georgia.....	257	271	246	296	295	282	275	283	269
Illinois.....	236	245	247	280	300	295	253	267	269
Indiana.....	238	271	228	266	266	266	248	269	250
Iowa.....	225	225	245	269	296	329	252	267	299
Kansas.....	228	225	232	172	296	293	252	264	269
Kentucky.....	196	204	210	217	214	286	199	206	241
Maine.....	246	246	231	287	310	284	266	273	256
Maryland.....	261	247	230	279	314	253	268	278	242
Massachusetts.....	234	243	218	247	279	251	239	259	234
Michigan.....	243	235	260	238	283	305	241	258	286
Minnesota.....	224	247	228	185	254	270	209	250	253
Missouri.....	266	258	226	287	302	290	272	272	252
New Hampshire.....	228	244	238	255	249	263	236	246	254
New Jersey.....	230	242	220	258	292	249	239	260	235
New Mexico.....	148	179	118	125	203	121	144	185	118
New York.....	221	222	218	248	263	278	231	237	248
North Carolina.....	244	254	194	255	280	253	247	262	220
Ohio.....	248	260	239	253	283	277	250	269	258
Oklahoma.....	239	255	267	293	309	339	263	274	308
Pennsylvania.....	249	259	224	282	297	273	261	274	250
Rhode Island.....	263	259	256	294	252	297	278	257	276
Tennessee.....	245	269	225	260	308	260	249	281	241
Texas.....	262	264	232	291	321	282	278	296	265
Utah.....	262	231	180	298	280	253	274	247	200
Vermont.....	266	286	272	295	303	280	279	293	276
Virginia.....	247	265	233	270	289	264	253	273	246
Washington.....	229	262	241	259	285	259	239	273	253
West Virginia.....	263	258	211	265	283	253	264	265	223
Wisconsin.....	237	246	223	251	257	241	241	249	231
Not segregated.....	241	233	219	236	233	279	240	233	252
Total.....	245	255	230	274	293	278	255	270	255

TABLE 60.—All quarries: Number of fatalities, by States, during the half decades ending 1921 and 1926 and during the year ended December 31, 1930

State	In and about quarry			In outside works			Total		
	Total, 1917-1921	Total, 1922-1926	1930	Total, 1917-1921	Total, 1922-1926	1930	Total, 1917-1921	Total, 1922-1926	1930
Alabama.....	4	13	1	6	6		10	19	1
Arkansas.....	6	1					6	1	
California.....	46	41	6	17	31	2	63	72	8
Colorado.....	4	1		3	3		7	4	
Connecticut.....	5	5	1	4	2	1	9	7	2
Georgia.....	3	5	1	4			7	5	1
Illinois.....	23	26	5	13	10	3	36	36	8
Indiana.....	17	18	5	8	12	2	25	30	7
Iowa.....	3	4	5	3	2	3	6	6	8
Kansas.....	4	3		7	7	2	11	10	2
Kentucky.....	12	8	4	1	3	1	13	11	5
Maine.....	1	9	1	3	1	1	4	10	2
Maryland.....	17	10	2	6	7	1	23	17	3
Massachusetts.....	17	12	4	9	3	2	26	15	6
Michigan.....	14	15		11	11		25	26	0
Minnesota.....	6	6		2	2	1	8	8	1
Missouri.....	9	16	1	3	6		12	22	1
New Hampshire.....	5	4		1			6	4	0
New Jersey.....	11	9	4	9	1		20	10	4
New Mexico.....					1			1	0
New York.....	13	36	3	14	10	1	27	46	4
North Carolina.....	4	17		4	1		8	18	
Ohio.....	26	33	4	14	22	3	40	55	7
Oklahoma.....	7	3		6			13	3	0
Pennsylvania.....	105	88	10	31	45	3	136	133	13
Rhode Island.....		2						2	0
Tennessee.....	13	22	5	3	7	1	16	29	6
Texas.....	11	12		11	6		22	18	0
Utah.....	3		3		1		3	1	3
Vermont.....	19	28	3	7	8	2	26	36	5
Virginia.....	13	19	2		3	1	13	22	3
Washington.....	3	7		1	1		4	8	0
West Virginia.....	16	1	1	2	3		18	4	1
Wisconsin.....	7	5	2	2	2		9	7	2
Not segregated.....	23	19	1	2	1	1	25	20	2
Total.....	470	498	74	207	218	31	677	716	105

TABLE 61.—All quarries: Number of injuries, by States, during the half decades ending 1921 and 1926 and during the year ended December 31, 1930

State	In and about quarry			In outside works			Total		
	Total, 1917-1921	Total, 1922-1926	1930	Total, 1917-1921	Total, 1922-1926	1930	Total, 1917-1921	Total, 1922-1926	1930
Alabama.....	729	904	113	479	742	83	1,208	1,646	196
Arkansas.....	47	52	21	16	5	6	63	57	27
California.....	1,402	2,540	418	2,205	2,725	166	3,607	5,265	584
Colorado.....	259	418	36	63	131	26	322	549	62
Connecticut.....	265	518	37	166	218	39	431	736	76
Georgia.....	115	1,008	51	170	989	93	285	1,997	144
Illinois.....	1,756	2,466	163	940	1,119	60	2,696	3,585	223
Indiana.....	1,435	2,510	244	1,168	1,345	133	2,603	3,855	377
Iowa.....	304	415	105	318	344	77	622	759	182
Kansas.....	374	319	61	849	924	31	1,223	1,243	92
Kentucky.....	529	770	91	72	114	20	601	884	111
Maine.....	304	722	102	366	586	58	670	1,308	160
Maryland.....	808	599	98	865	302	32	1,673	3,901	130
Massachusetts.....	1,195	1,820	204	700	1,817	207	1,895	3,637	411
Michigan.....	730	1,101	71	899	1,321	54	1,629	2,422	125
Minnesota.....	607	908	120	402	878	84	1,009	1,786	204
Missouri.....	1,405	2,125	280	750	743	153	2,155	2,868	433
New Hampshire.....	157	413	30	127	288	66	284	701	96
New Jersey.....	859	1,054	103	652	510	17	1,511	1,564	120
New Mexico.....	62	49	3	14	21	-----	76	70	3
New York.....	1,628	2,211	262	1,254	1,056	163	2,882	3,267	425
North Carolina.....	165	248	40	68	226	55	233	474	95
Ohio.....	2,300	2,747	227	1,441	2,124	200	3,741	4,871	427
Oklahoma.....	265	438	53	154	116	37	37	419	554
Pennsylvania.....	7,960	7,506	711	4,568	4,408	359	12,528	11,914	1,070
Rhode Island.....	116	201	6	66	32	5	182	233	11
Tennessee.....	410	983	179	178	566	51	588	1,549	230
Texas.....	531	824	69	645	829	81	1,176	1,653	150
Utah.....	191	375	26	97	110	10	288	485	36
Vermont.....	1,468	1,661	220	851	1,106	160	2,319	2,767	380
Virginia.....	470	853	134	155	267	60	625	1,120	194
Washington.....	181	265	30	57	113	11	238	378	41
West Virginia.....	684	531	74	256	218	8	940	749	82
Wisconsin.....	806	1,377	147	634	839	71	1,440	2,216	218
Not segregated.....	540	692	123	140	217	89	680	909	212
Total.....	31,057	41,623	4,652	21,785	27,349	2,765	52,842	68,972	7,417

TABLE 62.—All quarries: Fatalities per thousand 300-day workers employed, by States, during the half decades ending 1921 and 1926 and during the year ended December 31, 1930¹

State	In and about quarry			In outside works			Total		
	Total, 1917-1921	Total, 1922-1926	1930	Total, 1917-1921	Total, 1922-1926	1930	Total, 1917-1921	Total, 1922-1926	1930
Alabama.....	0.74	2.05	1.45	2.35	1.79	-----	1.25	1.96	0.52
Arkansas.....	6.91	1.39	-----	-----	-----	-----	5.22	.97	-----
California.....	6.30	3.70	4.69	1.64	1.64	.86	3.56	2.40	2.22
Colorado.....	2.09	.38	-----	3.17	1.52	-----	2.44	.86	-----
Connecticut.....	2.66	2.03	2.58	6.85	2.40	4.83	3.66	2.13	3.37
Georgia.....	.91	.83	1.35	1.23	-----	-----	1.07	.38	.45
Illinois.....	2.78	2.44	3.01	2.17	1.19	1.79	2.52	1.89	2.40
Indiana.....	1.76	1.27	2.96	1.34	1.24	.78	1.60	1.26	1.65
Iowa.....	1.49	2.33	10.46	1.53	.60	2.65	1.51	1.19	4.97
Kansas.....	1.51	1.35	-----	2.23	1.96	2.53	1.90	1.72	1.67
Kentucky.....	3.48	2.32	7.75	1.39	3.18	2.03	3.12	2.51	4.96
Maine.....	.32	2.08	1.43	.86	.25	1.27	.61	1.21	1.35
Maryland.....	3.30	3.04	4.63	1.61	2.03	2.02	2.59	2.52	3.23
Massachusetts.....	2.66	1.87	5.40	2.47	.55	2.29	2.59	1.27	3.72
Michigan.....	3.16	3.27	-----	4.54	2.20	-----	3.65	2.71	-----
Minnesota.....	1.85	1.79	-----	1.29	.78	1.30	1.67	1.35	.82
Missouri.....	.99	1.56	.72	.77	1.03	-----	.93	1.36	.39
New Hampshire.....	2.50	2.02	-----	1.01	-----	-----	2.01	1.34	-----
New Jersey.....	2.17	1.83	6.63	3.39	.31	-----	2.59	1.23	2.99
New Mexico.....	-----	-----	-----	-----	4.98	-----	-----	1.32	-----
New York.....	1.32	3.71	1.86	2.29	1.47	.49	1.69	2.79	1.09
North Carolina.....	1.11	3.77	-----	2.46	.44	-----	1.53	2.65	-----
Ohio.....	1.83	1.89	1.83	2.23	1.87	1.19	1.95	1.88	1.49
Oklahoma.....	3.27	1.21	-----	2.94	-----	-----	3.10	.73	-----
Pennsylvania.....	2.40	1.99	2.07	1.11	1.37	.45	1.90	1.73	1.14
Rhode Island.....	-----	2.11	-----	-----	-----	-----	-----	1.47	-----
Tennessee.....	2.75	3.30	4.07	2.06	1.93	.88	2.59	2.82	2.54
Texas.....	3.48	3.34	-----	2.71	1.09	-----	3.05	1.98	-----
Utah.....	2.88	-----	16.57	-----	1.29	-----	1.85	.47	10.95
Vermont.....	1.82	2.33	1.79	.72	.81	1.06	1.29	1.64	1.40
Virginia.....	2.34	3.09	2.29	-----	.78	1.50	1.65	2.20	1.94
Washington.....	2.43	7.53	-----	1.52	1.08	-----	2.11	4.32	-----
West Virginia.....	3.15	.18	1.16	.90	1.10	-----	2.47	.48	.80
Wisconsin.....	1.07	.85	3.04	.85	.79	-----	1.01	.83	1.70
Not segregated.....	4.45	3.93	1.58	1.34	.46	1.00	3.76	2.86	1.23
Total.....	2.31	2.19	2.47	1.61	1.23	.80	2.04	1.77	1.53

¹ Rates not shown where number of 300-day workers employed was less than 50.

TABLE 63.—All quarries: Injuries per thousand 300-day workers employed, by States, during the half decades ending 1921 and 1926 and during the year ended December 31, 1930¹

State	In and about quarry			In outside works			Total		
	Total, 1917-1921	Total, 1922-1926	1930	Total, 1917-1921	Total, 1922-1926	1930	Total, 1917-1921	Total, 1922-1926	1930
Alabama.....	134.40	142.68	163.29	187.70	221.69	67.10	151.45	169.99	101.61
Arkansas.....	54.15	72.02	90.52	56.94	16.18	77.92	54.83	55.29	87.38
California.....	192.11	229.47	327.07	212.08	144.12	71.31	203.84	175.63	161.95
Colorado.....	135.11	157.85	194.59	66.53	66.23	97.74	112.43	118.68	137.47
Connecticut.....	141.11	210.74	95.61	284.25	261.39	188.41	175.06	223.57	127.95
Georgia.....	34.81	166.80	68.73	52.45	138.32	62.46	43.54	151.37	64.55
Illinois.....	212.00	231.48	98.19	157.22	132.66	35.74	189.03	187.81	66.79
Indiana.....	148.74	176.46	144.64	195.81	138.96	52.14	166.72	161.28	88.96
Iowa.....	150.50	241.98	219.67	162.41	104.05	67.96	156.36	151.17	112.97
Kansas.....	140.92	143.76	150.99	270.38	258.17	39.14	211.08	214.38	76.92
Kentucky.....	153.56	223.64	176.36	100.00	121.02	40.57	144.30	201.60	110.01
Maine.....	97.47	166.94	146.34	104.90	148.35	73.51	101.39	158.07	107.67
Maryland.....	157.08	182.07	226.85	231.53	87.46	64.52	188.40	133.62	140.09
Massachusetts.....	187.27	283.22	275.30	191.73	334.62	236.84	188.90	306.76	254.49
Michigan.....	164.86	239.82	87.87	370.72	264.09	40.39	237.71	252.48	58.28
Minnesota.....	186.71	270.72	269.66	260.19	341.90	108.81	210.38	301.59	167.63
Missouri.....	154.92	206.69	200.86	193.00	127.29	127.93	166.35	177.94	167.18
New Hampshire.....	78.62	208.59	145.63	128.41	286.57	185.39	95.11	234.84	170.82
New Jersey.....	169.09	213.79	170.81	245.76	159.92	23.13	195.40	192.63	89.69
New Mexico.....	96.72	88.13	-----	120.69	104.48	-----	100.40	92.47	-----
New York.....	164.69	228.08	162.03	205.54	155.27	79.67	180.28	198.06	116.03
North Carolina.....	45.63	55.03	85.65	41.82	98.73	116.03	44.45	69.75	100.96
Ohio.....	161.88	157.72	103.89	229.90	180.24	79.15	182.70	166.81	90.62
Oklahoma.....	123.66	176.40	140.58	75.34	71.21	56.75	100.07	134.73	87.46
Pennsylvania.....	181.59	169.89	147.11	163.58	134.66	54.32	174.58	154.90	93.52
Rhode Island.....	112.40	212.03	90.91	60.27	76.92	66.67	85.57	170.82	78.01
Tennessee.....	86.85	147.66	145.53	122.09	156.05	44.89	95.16	150.62	97.21
Texas.....	167.83	229.33	133.20	159.18	150.18	64.75	162.97	181.39	84.79
Utah.....	183.48	273.52	143.65	168.11	141.94	107.53	178.00	226.00	131.39
Vermont.....	140.79	138.31	131.19	87.51	111.57	84.97	115.08	126.22	106.74
Virginia.....	84.76	138.77	153.14	66.44	69.51	89.82	79.33	112.13	125.73
Washington.....	146.80	284.95	146.34	86.36	122.43	27.50	125.73	203.99	67.77
West Virginia.....	134.86	95.38	86.05	115.52	79.59	20.78	128.98	90.18	65.86
Wisconsin.....	123.43	233.71	223.40	268.42	330.06	137.33	161.94	262.75	185.53
Not segregated.....	104.49	143.24	194.62	94.15	100.37	89.00	102.18	129.99	129.90
Total.....	152.64	182.97	155.06	169.95	154.69	71.76	159.33	170.60	108.23

¹ Rates not shown where number of 300-day workers employed was less than 50.

TABLE 64.—All quarries: Accident and labor data, by kinds of quarries, during the years ended December 31, 1921 to 1930

Year	Men employed		Days of labor performed		Average days active		Number of 300-day workers		Number killed		Number injured		Killed per thousand 300-day workers		Injured per thousand 300-day workers													
	In and about quarry	Total	In and about quarry	Total	In and about quarry	Total	In and about quarry	Total	In and about quarry	Total	In and about quarry	Total	In and about quarry	Total	In and about quarry	Total												
	In outside works		In outside works		In outside works		In outside works		In outside works		In outside works		In outside works		In outside works													
CEMENT ROCK																												
1921	3,432	7,388	958	2,179	279	290	3,196	7,263	10,459	7	13	20	741	1,492	2,233	19	79	91	231	85	205	42	213	50				
1922	3,623	8,637	1,260	2,756	319	312	3,572	9,187	12,759	11	18	29	873	1,565	2,438	3	96	27	244	40	170	35	191	98				
1923	3,996	9,382	1,378	3,189	340	336	4,490	7,337	10,633	14	17	25	1,133	2,068	3,199	31	41	1	261	23	194	32	213	71				
1924	4,198	8,312	1,519	3,830	376	333	4,466	9,228	13,694	14	17	31	888	1,428	2,316	13	18	4	26	198	84	75	109	13				
1925	4,547	8,252	1,799	4,356	330	324	4,627	8,554	12,481	16	24	40	827	1,501	2,328	3	34	1	78	178	73	84	97	103	55			
1926	4,850	8,146	2,222	5,853	304	323	4,914	8,519	12,427	10	27	37	608	1,486	2,094	2	38	1	51	123	73	76	15	85	72			
1927	4,571	8,649	2,320	5,962	337	320	4,362	8,575	12,237	7	6	13	459	1,217	1,670	1	80	1	64	105	23	61	23	69	13			
1928	4,153	8,162	2,215	5,957	285	320	3,951	8,558	12,809	7	18	25	338	823	1,611	7	91	1	05	85	55	41	44	48	76			
1929	3,817	8,070	2,087	5,455	277	323	3,524	8,188	12,710	10	16	26	294	650	944	2	88	1	1	05	88	53	54	43	48			
1930	3,590	8,408	1,998	5,046	256	308	3,061	8,229	11,853	4	13	17	300	378	678	1	77	1	86	98	01	22	47	34	10			
GRANITE																												
1921	7,105	2,374	9,479	1,571	842	221	222	5,240	1,770	7,010	15	3	18	556	384	940	2	86	1	69	2	37	106	11	216	95	134	09
1922	6,320	2,636	8,956	1,456	402	249	3,564	2,184	7,038	9	1	10	564	472	1,036	1	86	1	46	1	42	116	216	12	177	20		
1923	8,309	3,289	11,598	2,401	299	256	7,005	2,945	9,950	11	1	9	1,107	664	1,771	28	90	188	03	223	37	177	99	77	99			
1924	8,841	3,312	12,153	2,221	693	251	249	7,406	2,708	10,111	11	1	12	1,218	761	1,979	1	49	37	1	104	46	281	33	105	73		
1925	8,247	3,773	12,020	2,038	846	258	250	7,029	3,370	10,399	10	1	10	1,230	876	2,106	1	42	22	96	174	08	294	80	102	52		
1926	6,688	3,924	10,612	1,669	351	242	273	5,429	3,965	8,397	19	1	20	972	688	1,660	3	52	28	2	173	39	782	89	107	14		
1927	6,938	4,086	11,024	1,659	239	247	5,581	3,842	9,073	16	7	23	1,042	835	1,977	2	89	1	98	2	185	39	263	98	117	90		
1928	6,920	4,902	11,314	1,674	452	242	263	5,381	3,958	9,439	11	11	11	906	807	1,713	1	97	1	17	162	37	209	38	131	40		
1929	6,293	4,902	11,195	1,532	359	243	248	5,108	4,138	9,246	17	6	23	842	673	1,515	3	33	1	45	2	164	94	124	104	143	80	
1930	5,571	4,843	10,414	1,261	316	232	249	4,305	4,020	8,325	4	12	672	519	1,911	86	1	00	1	44	136	10	138	10	148	69		
LIMESTONE																												
1921	26,887	12,664	39,551	5,728	317	244	223	10,094	3,065	29,399	41	17	58	3,309	1,939	5,248	2	15	1	65	1	97	173	30	188	16	178	51
1922	26,668	13,283	39,951	6,407	780	279	253	11,591	3,693	33,728	45	18	63	4,058	1,936	5,994	2	11	1	46	1	87	189	99	126	52	177	72
1923	31,009	15,416	46,425	8,134	406	283	265	12,115	4,034	41,518	56	23	78	4,776	2,304	7,060	0	31	1	86	1	87	178	14	184	1	149	33
1924	31,969	16,322	48,291	8,793	634	278	287	12,533	4,139	42,732	54	10	70	4,860	2,552	7,421	9	81	0	03	1	64	178	14	173	14	173	35
1925	27,391	13,057	40,448	7,953	719	248	278	12,046	3,708	43,708	43	18	61	4,580	2,185	6,715	1	90	1	49	1	70	200	94	187	13	163	47
1926	26,532	12,507	39,039	7,311	802	248	265	12,910	3,847	42,947	55	14	69	4,544	2,067	6,160	2	51	1	27	2	12	09	207	187	28	200	96
1927	27,013	12,596	39,609	7,735	760	277	258	12,446	3,945	43,765	48	15	73	4,799	2,270	7,069	2	58	1	53	2	16	213	80	200	55	239	86
1928	25,329	12,501	37,830	6,237	960	246	281	12,783	3,721	42,323	51	19	60	4,764	1,755	5,399	1	97	1	62	1	14	173	23	146	176	02	
1929	23,693	12,467	36,160	5,822	814	246	279	12,409	3,600	41,696	53	23	58	3,689	1,628	5,315	1	80	1	98	1	87	100	41	140	29	171	46
1930	21,319	12,874	34,193	4,881	652	229	265	12,416	3,627	40,947	41	8	49	2,659	1,287	3,946	2	52	1	70	1	17	103	41	113	25	142	78

TABLE 64.—All quarries: Accident and labor data, by kinds of quarries, during the years ended December 31, 1921 to 1930—Continued

Year	Men employed		Days of labor performed		Average days active		Number of 300-day workers			Number killed			Number injured			Killed per thousand 300-day workers			Injured per thousand 300-day workers						
	In and about	Total	In and about	Total	In and about	Total	In and about	In works	In and about	Total	In and about	In works	In and about	Total	In and about	In works	In and about	Total	In and about	In works	In and about	Total			
																							outside	quarry	quarry
MARBLE																									
1921	2,138	2,411	568,944	638,523	266	265	1,897	2,128	4,025	5	1	6	170	236	406	2.64	.47	1.49	89.62	110.90	100.87	591.93	43.10	39.14	2.76
1922	2,268	2,535	646,753	741,155	292	289	2,156	2,470	4,626	2	—	2	238	333	591	.86	.36	.59	106.08	145.92	127.88	665.86	59.10	68.14	5.12
1923	2,542	2,809	895,807	840,745	274	259	2,319	2,903	5,122	2	1	3	246	409	655	.86	.36	.59	106.08	145.92	127.88	754.12	26.11	20.11	22.17
1924	2,486	3,278	716,361	998,898	288	305	2,388	3,329	5,717	3	4	7	329	425	754	.86	.36	.59	106.08	145.92	127.88	623.88	.32	.56	117.83
1925	2,334	3,078	684,826	925,690	293	301	2,283	3,096	5,369	2	1	3	269	354	623	.86	.36	.59	106.08	145.92	127.88	782.31	.12	.63	160.12
1926	2,359	3,098	672,579	947,444	285	306	2,242	3,158	5,400	7	2	9	359	423	782	.86	.36	.59	106.08	145.92	127.88	738.76	.91	.35	123.95
1927	2,883	3,270	766,507	1,048,917	273	302	2,588	3,290	5,912	2	3	5	325	413	738	.86	.36	.59	106.08	145.92	127.88	718.23	.34	.25	108.05
1928	2,763	3,014	767,616	1,183,767	278	295	2,588	3,559	6,505	6	1	7	270	448	718	.86	.36	.59	106.08	145.92	127.88	609.12	.28	.50	79.14
1929	2,631	4,027	704,364	1,206,470	268	300	2,348	4,021	6,369	3	2	5	268	341	609	.86	.36	.59	106.08	145.92	127.88	512.91	.96	.56	117.11
1930	2,352	3,735	612,936	1,067,365	261	286	2,043	3,558	5,601	4	2	6	231	281	512	.86	.36	.59	106.08	145.92	127.88	374.54	.38	.11	19.99
SANDSTONE AND BLUESTONE																									
1921	3,090	688	550,953	167,357	178	200	183	1,836	2,394	1	2	3	283	81	374	.54	.38	.26	189.59	145.16	156.22	337.12	.23	.11	99.31
1922	3,140	1,165	733,962	270,626	234	232	233	2,447	3,849	3	1	4	243	94	337	.64	.48	.33	200.08	108.78	119.42	498.11	.48	.37	188.12
1923	3,680	1,292	896,605	314,434	255	243	252	3,122	4,448	2	—	2	384	114	498	.64	.48	.33	200.08	108.78	119.42	720.14	.48	.37	188.12
1924	4,279	1,151	1,010,366	297,066	236	232	235	3,368	4,258	5	3	8	546	174	720	.64	.48	.33	200.08	108.78	119.42	785.32	.29	.40	32.17
1925	3,844	1,123	910,891	265,015	237	236	237	3,086	3,919	10	3	13	525	260	785	.64	.48	.33	200.08	108.78	119.42	626.13	.30	.11	162.95
1926	3,915	1,003	921,187	240,343	229	240	236	3,071	3,872	4	—	4	439	187	626	.64	.48	.33	200.08	108.78	119.42	631.14	.41	.69	151.81
1927	2,802	1,448	640,565	355,864	225	240	236	2,185	3,321	3	2	5	387	244	631	.64	.48	.33	200.08	108.78	119.42	473.10	.05	.95	102.17
1928	2,580	1,269	569,041	315,495	201	249	230	1,897	2,949	2	1	3	326	147	473	.64	.48	.33	200.08	108.78	119.42	305.37	.99	.08	2.79
1929	2,592	1,144	500,641	762,215	205	202	204	1,769	2,772	2	1	3	280	63	305	.64	.48	.33	200.08	108.78	119.42	305.37	.99	.08	2.79
1930	2,377	1,168	474,947	278,027	200	238	212	1,583	2,510	6	1	7	222	83	305	.64	.48	.33	200.08	108.78	119.42	385.14	.41	.31	40.34
SLATE																									
1921	2,695	869	626,096	228,300	232	293	240	2,087	2,848	3	1	4	280	105	385	.44	.31	.11	140.34	16.13	98.135	445.36	.63	.19	119.00
1922	2,841	1,003	743,865	304,166	277	263	277	2,479	3,493	9	2	11	285	150	445	.44	.31	.11	140.34	16.13	98.135	559.28	.87	.22	13.45
1923	3,231	1,028	833,658	289,099	263	260	260	2,785	3,964	8	—	8	406	133	559	.44	.31	.11	140.34	16.13	98.135	568.75	.55	.22	15.65
1924	3,158	966	798,222	263,093	275	275	258	2,661	3,538	2	—	2	415	151	568	.44	.31	.11	140.34	16.13	98.135	583.27	.82	.22	16.17
1925	2,832	1,151	732,905	305,641	259	289	262	2,443	3,462	8	1	9	419	166	583	.44	.31	.11	140.34	16.13	98.135	385.14	.41	.31	40.34

1926.....	3, 196	1, 106	4, 304	857, 517	201, 817	1, 140, 334	268	263	287	2, 868	973	3, 631	8	1	8	1	202	121	323	.88	.47	178, 13	122, 35	152, 14		
1927.....	2, 489	1, 247	3, 736	645, 444	313, 316	935, 760	259	251	237	2, 152	1, 044	3, 196	6	1	6	1	404	185	589	2.79	.96	2, 19	187, 73	177, 20	184, 29	
1928.....	2, 230	1, 444	3, 674	586, 317	382, 496	985, 813	265	264	1, 954	1, 975	3, 229	4	4	4	4	335	178	513	2.05	.1	.24	171, 48	136, 61	158, 87		
1929.....	2, 116	1, 436	3, 552	529, 104	367, 935	897, 039	250	256	253	1, 764	1, 226	2, 990	2	2	2	334	158	492	1.13	.1	.67	189, 34	128, 87	164, 55		
1930.....	1, 588	1, 367	2, 955	340, 338	296, 640	636, 978	214	217	216	1, 134	989	2, 123	1	1	1	202	121	323	.88	.47	178, 13	122, 35	152, 14			
TRAP ROCK																										
1921.....	3, 045	1, 354	5, 299	819, 616	327, 302	1, 146, 918	208	242	216	2, 732	1, 091	3, 823	8	3	8	11	680	109	870	2.93	2.75	2, 88	248, 00	182, 40	929, 92	
1922.....	3, 637	2, 186	4, 855	876, 152	284, 126	1, 160, 278	239	239	239	2, 021	1, 047	3, 698	13	3	13	778	220	998	4.45	3.8	3, 99	286, 33	222, 31	258, 01		
1923.....	4, 861	2, 081	6, 942	1, 062, 903	649, 642	1, 612, 845	204	250	3, 583	1, 832	3, 878	15	9	18	594	534	1, 228	3, 672	73	8.89	282, 33	182, 31	228, 47			
1924.....	4, 186	1, 070	5, 873	886, 244	411, 633	1, 306, 877	213	246	223	2, 964	1, 372	3, 856	7	1	8	725	296	1, 021	2.36	1.73	1, 84	242, 96	213, 74	234, 89		
1925.....	3, 029	1, 283	4, 282	639, 708	284, 866	944, 574	218	227	221	2, 199	950	3, 149	12	1	13	852	191	1, 023	3.46	1.09	4.13	378, 33	201, 03	824, 87		
1926.....	3, 080	740	3, 890	693, 245	181, 907	875, 152	225	246	239	2, 311	606	2, 917	7	7	7	566	162	728	3.03	2.40	344, 92	267, 33	249, 57			
1927.....	2, 853	1, 102	3, 955	652, 026	279, 580	831, 006	229	234	236	2, 173	832	3, 105	7	2	9	599	180	779	3.22	1.52	3, 90	273, 69	188, 13	250, 89		
1928.....	2, 733	1, 123	3, 908	607, 455	294, 222	861, 637	218	226	220	2, 025	847	2, 872	6	3	9	478	113	591	2.96	3.54	3.13	266, 03	183, 41	203, 78		
1929.....	2, 561	1, 048	3, 599	360, 451	230, 763	811, 214	220	239	225	1, 868	856	2, 704	10	1	11	466	126	323	3.39	1.20	4.9	239, 46	150, 72	218, 95		
1930.....	2, 276	1, 165	3, 441	480, 978	234, 931	735, 959	211	219	214	1, 603	850	2, 453	10	3	13	366	96	462	6.24	3.53	5.30	228, 32	112, 94	188, 34		
TOTAL																										
1921.....	49, 292	27, 893	77, 185	10, 824, 541	7, 163, 006	17, 987, 547	220	257	233	36, 082	23, 876	59, 958	80	40	120	6, 029	4, 436	10, 465	2.22	1.68	2.00	167, 09	185, 79	174, 54		
1922.....	48, 527	20, 554	76, 081	11, 936, 454	8, 721, 884	20, 658, 338	246	263	291	39, 738	29, 073	68, 861	92	40	132	7, 049	4, 790	11, 839	2.31	1.38	1.92	177, 16	164, 76	171, 93		
1923.....	57, 188	35, 267	92, 455	15, 067, 691	10, 478, 168	25, 545, 859	263	287	276	50, 226	34, 927	85, 163	99	44	143	8, 946	6, 044	14, 900	1.97	1.26	1.63	178, 11	173, 05	176, 04		
1924.....	59, 126	35, 116	94, 242	15, 151, 796	10, 176, 062	25, 327, 858	256	290	269	50, 506	33, 920	84, 426	96	42	138	8, 990	5, 787	14, 777	1.90	1.24	1.63	178, 00	170, 61	175, 03		
1925.....	52, 224	39, 648	91, 872	13, 278, 915	11, 767, 040	25, 045, 955	254	297	273	44, 263	33, 224	83, 487	101	48	149	8, 632	5, 533	14, 165	2.28	1.22	1.78	195, 02	141, 06	169, 67		
1926.....	50, 620	40, 526	91, 146	12, 812, 387	11, 896, 013	24, 708, 400	253	294	271	42, 708	39, 653	82, 361	110	44	154	8, 006	5, 195	13, 201	2.58	1.11	1.87	187, 46	131, 01	160, 28		
1927.....	49, 549	41, 968	91, 517	12, 426, 312	11, 356, 249	24, 782, 561	251	294	271	41, 421	41, 188	82, 609	99	36	135	8, 015	5, 444	13, 459	2.39	1.87	1.63	193, 50	132, 17	162, 92		
1928.....	46, 758	42, 909	89, 667	11, 628, 064	12, 769, 313	24, 397, 377	249	298	272	38, 760	42, 565	81, 325	77	42	119	6, 207	4, 271	10, 568	1.99	1.99	1.46	162, 46	100, 34	129, 95		
1929.....	43, 693	41, 868	85, 561	10, 736, 883	12, 230, 696	22, 967, 579	246	292	268	35, 700	40, 769	76, 559	78	48	126	6, 173	3, 637	9, 810	2.18	1.18	1.65	172, 48	89, 21	128, 14		
1930.....	39, 073	41, 560	80, 633	9, 000, 450	11, 558, 922	20, 559, 372	230	278	255	30, 001	38, 530	68, 531	74	31	105	4, 652	2, 765	7, 417	2.47	.80	1.53	155, 06	71, 76	108, 23		

COMPARISON OF QUARRY AND MINE ACCIDENTS

The fatality rate from accidents at coal mines is nearly always higher than at metal mines; also, the rate for metal mines is usually higher than that for stone quarries. In fact, comparative records covering the 11 years from 1920 to 1930, inclusive, do not show a single year when the fatality rate for metal mines was as high as that for coal mines for the same year, or when the rates for the same year were as high for quarries as for metal mines. The lowest rate for coal mines during the 11-year period was 3.78 (1920); this rate for coal mines has been exceeded by the metal-mine rate on five occasions—in 1911, 1912, 1914, 1915, and 1917. These years witnessed the occurrence of one or more major disasters in metal mines—that is, disasters in each of which five or more lives were lost—and this, together with the fact that the annual fatality rates for metal mines were usually higher in earlier years than they are now, even for non-major or ordinary accidents, is probably the main reason for the metal-mine rates for those years being higher than the 1920 rate of 3.78 for coal mines.

TABLE 65.—United States: Accident data, including rates for different branches of mineral industries in 1930 compared on a 300-day basis (length of shift not considered)

Industry	Average days active	Men employed		Man-shifts	Killed	Injured	Killed per thousand 300-day workers	Injured per thousand 300-day workers
		Actual number	Equivalent in 300-day workers					
Coal mines.....	192	644,006	412,979	123,893,697	2,063	103,821	5.00	251.40
All metal mines.....	270	103,233	92,900	27,869,982	271	15,594	2.92	167.86
Copper.....	298	27,692	27,501	8,250,237	76	5,321	2.76	193.48
Gold, silver, and miscellaneous.....	269	27,045	24,252	7,275,603	109	5,813	4.49	239.69
Iron.....	263	29,410	25,744	7,723,155	69	2,096	2.68	81.42
Lead and zinc (Mississippi Valley).....	215	8,524	6,123	1,836,823	10	1,081	1.63	176.55
Nonmetallic mineral.....	264	10,562	9,280	2,784,164	7	1,283	.75	138.25
All quarries.....	255	80,633	68,531	20,559,372	105	7,417	1.53	108.23
Cement rock.....	298	19,998	19,883	5,964,948	17	678	.86	34.10
Granite.....	240	10,414	8,325	2,497,394	12	1,191	1.44	143.06
Limestone.....	242	34,193	27,636	8,290,818	49	3,946	1.77	142.78
Marble.....	276	6,087	5,601	1,680,301	6	512	1.07	91.41
Sandstone and bluestone.....	212	3,545	2,510	752,974	7	305	2.79	121.51
Slate.....	216	2,955	2,123	636,978	1	323	.47	152.14
Trap rock.....	214	3,441	2,453	735,959	13	462	5.30	188.34
In and about quarry.....	230	39,073	30,001	9,000,450	74	4,652	2.47	155.06
In outside works.....	278	41,560	38,530	11,558,922	31	2,765	.80	71.76
Metallurgical plants.....	327	40,787	44,403	13,321,025	25	2,726	.56	61.39
Ore-dressing plants.....	287	11,648	11,131	3,339,399	6	881	.54	79.15
Smelters.....	350	17,168	20,035	6,010,530	7	1,061	.35	52.96
Auxiliary works.....	332	11,971	13,237	3,971,096	12	784	.91	59.23
All coke ovens.....	347	19,855	22,936	6,880,895	28	1,022	1.22	44.56
Beehive.....	202	2,176	1,464	439,296	1	104	.68	71.04
By-product.....	364	17,679	21,472	6,441,599	27	918	1.26	42.75
Total, 1930.....	217	888,514	641,749	192,524,971	2,492	130,580	3.88	203.48

TABLE 66.—*Quarries, metal mines, and coal mines: Chief causes of fatalities, showing percentage due to each cause, by years, 1921 to 1930*

Industry	Cause of death								Total
	Falls of overburden, roof, quarry material, ore, or coal	Explosives	Haulage and handling rock, ore, or coal	Falls of persons	Electricity	Machinery	Gas and dust explosions	Other causes	
1921									
Quarries.....	16.67	14.17	17.50	9.17	7.50	15.83	-----	19.16	100
Metal mines.....	31.30	10.00	10.00	17.39	1.74	2.61	-----	26.96	100
Coal Mines.....	51.38	7.12	19.35	.90	4.86	1.70	6.32	8.37	100
1922									
Quarries.....	18.94	27.27	12.88	5.30	4.55	18.94	-----	12.12	100
Metal mines.....	30.52	8.72	11.63	13.95	2.04	3.20	-----	29.94	100
Coal mines.....	45.77	4.68	19.91	.71	4.18	2.07	15.68	7.00	100
1923									
Quarries.....	21.68	8.39	23.08	11.19	.70	14.68	-----	20.28	100
Metal mines.....	30.25	11.44	17.44	13.62	3.27	3.27	-----	20.71	100
Coal mines.....	47.40	4.67	19.21	.90	3.37	1.99	15.11	7.35	100
1924									
Quarries.....	18.84	11.60	18.12	11.59	3.62	15.22	-----	21.01	100
Metal mines.....	31.34	12.44	15.79	10.53	3.11	2.15	-----	24.64	100
Coal mines.....	44.32	4.17	17.53	.63	4.05	1.55	22.37	5.38	100
1925									
Quarries.....	22.82	13.43	16.78	10.07	4.02	18.12	-----	14.76	100
Metal mines.....	31.26	14.02	16.18	12.12	5.39	2.16	-----	18.87	100
Coal mines.....	48.34	4.57	17.95	.67	4.48	2.01	15.44	6.54	100
1926									
Quarries.....	20.78	14.94	17.53	5.84	7.14	12.99	-----	20.78	100
Metal mines.....	29.30	11.39	10.48	11.39	4.88	1.39	-----	31.17	100
Coal mines.....	48.19	3.85	19.17	.52	4.45	1.39	16.75	5.68	100
1927									
Quarries.....	28.15	13.33	15.56	8.89	5.19	14.81	-----	14.07	100
Metal mines.....	29.26	10.51	13.35	15.06	2.84	4.83	-----	24.15	100
Coal mines.....	51.50	4.93	17.98	.45	5.11	1.70	11.07	7.26	100
1928									
Quarries.....	24.37	7.56	15.13	15.97	5.88	17.65	-----	13.44	100
Metal mines.....	32.24	7.69	14.65	12.45	3.67	2.93	-----	26.37	100
Coal mines.....	49.08	3.40	18.48	.41	4.27	1.79	17.28	5.29	100
1929									
Quarries.....	15.08	13.49	20.64	9.52	4.76	17.46	-----	19.05	100
Metal mines.....	35.14	10.86	14.86	11.71	2.29	3.14	-----	22.00	100
Coal mines.....	54.05	4.02	20.76	.87	4.30	1.87	8.92	5.21	100
1930									
Quarries.....	22.86	13.33	15.23	8.57	3.81	18.10	-----	18.10	100
Metal mines.....	30.63	14.39	11.44	14.39	3.69	2.58	-----	22.88	100
Coal mines.....	52.50	3.78	17.55	.24	4.26	2.86	12.80	6.01	100

EXPLOSIVES USED BY QUARRIES AND NONMETALLIC MINERAL MINES

The quarrying industry used about 16.3 per cent of the total number of pounds of all industrial explosives consumed in the United States in 1930. This quantity consisted, by weight, of 5.3 per cent of black blasting powder, 94 per cent of high explosives other than permissible, and 0.7 per cent of permissible explosives.

The total quantity of all classes of industrial explosives used during the year included 68,333,964 pounds of high explosives other than permissible, 3,825,550 pounds of black blasting powder, and 501,502 pounds of permissible explosives. These figures include small quantities of explosives used in mines that produced nonmetallic minerals other than coal.

Permissible explosives are high explosives that have passed certain tests prescribed by the Bureau of Mines. They are used almost entirely in coal mines, but small quantities find their way into other mines and quarries.

The figures in Table 67 show the quantity of explosives sold in 1930 for use in quarries and nonmetallic mines in each State. The largest quantities were used in Pennsylvania, Ohio, New York, Texas, Illinois, Michigan, Missouri, Kentucky, Indiana, Virginia, West Virginia, and California, States in which quarrying or nonmetallic mining ranks as an important industry.

TABLE 67.—Amount of explosives used by quarries and nonmetallic mineral mines in the United States during the year ended December 31, 1930

State	Black blasting powder			High explosives other than permissible	Permissible explosives
	Granular	Pellet	Total		
	Pounds	Pounds	Pounds	Pounds	Pounds
Alabama	97,425		97,425	1,090,750	5,750
Alaska				55,000	
Arizona				181,650	
Arkansas	425		425	523,700	250
California	28,275		28,275	2,102,925	
Colorado	82,375	125	82,500	221,035	3,650
Connecticut	5,600		5,600	591,309	
Delaware	1,250		1,250	18,784	
Florida	168,200	50	168,250	1,129,018	50
Georgia	152,375		152,375	541,500	
Idaho	2,025		2,025	60,700	
Illinois	25,950	3,850	29,800	3,581,052	800
Indiana	161,375	4,975	166,350	2,354,940	350
Iowa	48,375	200	48,575	1,878,738	
Kansas	40,825	4,000	44,825	1,365,000	18,865
Kentucky	277,425	55,550	332,975	2,306,189	5,425
Louisiana				1,095,271	25,600
Maine	19,975		19,975	240,025	
Maryland and District of Columbia	18,875		18,875	715,388	10,700
Massachusetts	21,875		21,875	882,581	
Michigan	12,750	200	12,950	3,561,400	33,950
Minnesota	58,600		58,600	171,525	
Mississippi	24,000		24,000	11,500	
Missouri	302,475	11,250	313,725	2,612,900	49,150
Montana	58,625		58,625	104,460	
Nebraska	2,200		2,200	148,486	
Nevada				233,000	
New Hampshire	11,900		11,900	44,966	
New Jersey	3,775		3,775	975,269	
New Mexico	44,100	2,000	46,100	51,584	
New York	93,125	600	93,725	6,680,677	48,100
North Carolina	61,750	200	61,950	629,205	
North Dakota	325		325	488	
Ohio	307,250	96,150	403,400	6,817,347	15,076
Oklahoma	60,575	1,600	62,175	1,290,964	
Oregon	1,000		1,000	90,357	
Pennsylvania	473,175	3,900	477,075	12,632,028	240,015
Rhode Island	2,850		2,850	7,800	
South Carolina	26,700		26,700	328,150	
South Dakota	9,675		9,675	54,050	
Tennessee	207,000	1,050	208,050	711,925	2,450
Texas	266,650	100	266,750	3,617,275	
Utah	55,500		55,500	322,300	
Vermont	118,475	1,500	119,975	178,185	
Virginia	26,725	2,000	28,725	2,211,810	12,319
Washington	24,325		24,325	392,230	
West Virginia	20,475		20,475	2,180,900	29,002
Wisconsin	82,125		82,125	1,111,643	
Wyoming	127,500		127,500	245,385	
Total	3,636,250	189,300	3,825,550	68,333,964	501,502
Percentage of grand total	5.0	0.3	5.3	94.0	0.7

PUBLICATIONS ON ACCIDENT STATISTICS⁴

BULLETIN 69. Coal-Mine Accidents in the United States and Foreign Countries, compiled by F. W. Horton. 1913. 102 pp. 3 pls. 40 figs. 25 cents.

BULLETIN 115. Coal-Mine Fatalities in the United States, 1870-1914, With Statistics of Coal Production, Labor, and Mining Methods, by States and Calendar Years, compiled by A. H. Fay. 1916. 570 pp. 3 pls. 13 figs. 40 cents.

BULLETIN 140. Occupational Hazards at Blast-Furnace Plants and Accident Prevention, Based on Records of Accidents at Blast Furnaces in Pennsylvania in 1915, by F. H. Wilcox. 1917. 155 pp. 16 pls. 30 cents.

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†BULLETIN 241. Coal-Mine Fatalities in the United States, 1923, by W. W. Adams. 1924. 88 pp.

BULLETIN 246. Quarry Accidents in the United States, During the Calendar Year 1923, by W. W. Adams. 1925. 76 pp. 15 cents.

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⁴ Obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C., at the price stated. Publications marked † are out of print.

- †TECHNICAL PAPER 302. Coal-Mine Fatalities in the United States, 1921, by W. W. Adams. 1922. 72 pp.
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