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*REPORT OF THE  
COMPTROLLER GENERAL  
OF THE UNITED STATES*

090085

Analysis Of Closure Orders  
Issued Under The  
Federal Metal And Nonmetallic  
Mine Safety Act Of 1966

Department of the Interior

This report contains information on closure orders issued to noncoal mines from January 1, 1972, to September 1, 1975. The orders are summarized and analyzed on several bases, including the health and safety standards cited; extent of mine closure and time required to abate (correct) the violations; and the location, types, and sizes of the mines and mills cited.

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COMPTROLLER GENERAL OF THE UNITED STATES  
WASHINGTON, D.C. 20548

B-166582

The Honorable Harrison A. Williams, Jr.  
Chairman, Committee on Labor and Public  
Welfare  
United States Senate

Dear Mr. Chairman:

In response to your request of July 24, 1975, and subsequent discussions with your office, we obtained information on closure orders issued to noncoal mines by the Department of the Interior's Mining Enforcement and Safety Administration (MESA). Issuance of such orders is authorized by the Federal Metal and Nonmetallic Mine Safety Act of 1966 (30 U.S.C. 721).

Our analysis was directed to interviewing MESA officials and categorizing, classifying, summarizing, and analyzing basic closure order information maintained on MESA's computerized Management Control System. We did not independently verify the accuracy or reliability of the information obtained. We discussed the information in this report with your office on October 23, 1975, and, as requested, we did not obtain formal written comments from the Department.

Following is a short synopsis of our findings.

- A total of 4,562 closure orders were issued during the period January 1, 1972, to September 1, 1975. Of these orders, 2,353 were issued for imminent danger situations, 1,925 for operators' failure to comply with violation notices, and 284 did not specify whether imminent danger or noncompliance were involved. (See p. 3.)
- Of the 420 mandatory health and safety standards, a total of 239 were cited as being in violation and given as reasons for the 4,562 closure orders. However, a relatively small number of violations of standards accounted for most of the orders. For example, violations of 5 standards were the basis for 38 percent of the orders, 25 were the basis for 75 percent, and 100 were the basis for 94 percent. (See p. 3.)

--The five standards most frequently cited in violation were:

1. Inadequate guards on moving machine parts (12 percent).
2. Inadequate brakes on powered mobile equipment (8 percent).
3. Men working near or under dangerous banks (7 percent).
4. Failure to examine and test ground conditions (6 percent).
5. Unsafe means of access to working places (5 percent).

Closure orders issued for items 1 and 5 were considered to be primarily noncompliance situations, whereas orders for the violation of the other three standards were considered to be primarily imminent danger situations. (See p. 4.)

--About 5 percent of the closure orders issued in 1974 resulted in closing an entire mine. About 39 percent of the orders resulted in closing a section of a mine; 43 percent resulted in withdrawing unsafe equipment from operation; and 11 percent involved personal protection violations, such as employees not wearing safety belts, life jackets, hard hats, and protective footwear. In the latter case employees were provided with the equipment and were required to use it. (See p. 6.)

--At September 1, 1975, 4,013 of the 4,562 closure orders had been abated (corrected) or withdrawn. The remaining 549 orders were still outstanding. About 47 percent, or 1,899, of the 4,013 closure orders were abated while the inspectors were still on the mining properties. (See p. 5.)

--Two of MESA's 12 subdistricts--Birmingham and Dallas--accounted for about 45 percent, or 2,040, of the 4,562 closure orders. To put this percentage in perspective, these 2 subdistricts had jurisdiction over about 15 percent, or 2,169, of the 14,847 mining operations (mines and mills) active in calendar year 1974. (See p. 7.)

--About 58 percent, or 2,643, of the 4,562 closure orders were issued in 9 States and 1 territory--Texas, Alabama, Puerto Rico, Pennsylvania, Missouri, Louisiana, Georgia, Michigan, Nevada, and Illinois. These States and this territory accounted for 23 percent of the mining operations active in calendar year 1974 and for 26 percent of the total injuries reported in 1974. (See p. 8.)

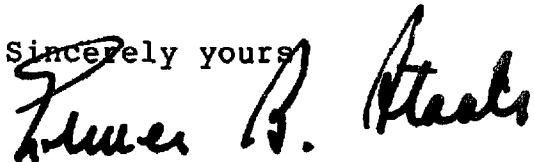
--The 4,562 closure orders were issued to 1,609 mining operations. About 22 percent of the orders were issued to 40 mining operations, 33 percent to 83 operations, and 52 percent to 222 operations. The 222 mining operations represent about 1.5 percent of the total operations active in calendar year 1974. (See p. 9.)

--Of the 4,562 closure orders, 91 were issued as a result of accident investigations. In 11 of the 91 instances, similar violations had been cited in the previous regular inspection. The investigations were conducted at 70 mining operations. The most prevalent violations cited involved lead and zinc, salt, gold and silver, limestone, clay and shale, and sand and gravel operations. (See pp. 11 and 12.)

The results of our analysis are summarized in the attached report. Except as otherwise noted, all data pertains to closure orders issued from January 1, 1972, to September 1, 1975.

As agreed with your office, the statistics will be analyzed further during our current review of MESA's administration of the 1966 act; our conclusions and recommendations will be presented in a report to you at a later date.

Sincerely yours



Comptroller General  
of the United States

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ABBREVIATIONS

MESA    Mining Enforcement and Safety Administration

ANALYSIS OF CLOSURE ORDERS ISSUED  
UNDER THE FEDERAL METAL AND  
NONMETALLIC MINE SAFETY ACT OF 1966

INTRODUCTION

The objective of the Federal Metal and Nonmetallic Mine Safety Act of 1966 (30 U.S.C. 721) is to eliminate or greatly reduce the number of fatalities, injuries, and occupational illnesses in the noncoal mining industry which has historically been classified among the most hazardous. Initially, the major responsibility for carrying out the 1966 act was assigned by the Secretary of the Interior to the Bureau of Mines. However, on May 7, 1973, the Secretary issued an order creating the Mining Enforcement and Safety Administration (MESA) within the Department of the Interior and transferred to it the responsibility for enforcement of the act.

To protect mine workers, the act requires that health and safety standards be developed, promulgated, and enforced. To insure compliance with the standards, the act provides for inspection of mines and mills and authorizes the Secretary of the Interior or his duly authorized representatives to withdraw employees from mines or sections of mines where notices of violations are not complied with or when imminent danger exists.

MESA reported to the Congress that it conducted 1,632 regular inspections and 1,214 spot inspections at underground mines during calendar year 1974. This is an average of 2.4 regular inspections and 1.8 spot inspections for each mine. Spot inspections are made for a single purpose, such as determining whether violations have been corrected satisfactorily, whereas regular inspections involve an inspection of an entire mine. During the same period, 8,959 regular and 8,564 spot inspections were made of open pit, quarry, and sand and gravel operations. Also, 1,472 regular and spot inspections were made at mills which either were not located on mine property or, if located on mine property, were inspected separately.

Under the act, when MESA inspectors find a violation of a mandatory standard, they are authorized to issue a notice to the mine operator citing the violation and to specify a reasonable time for total abatement of the hazard. If the mine operator fails to correct the violation within the time specified, inspectors may either extend the time for abatement if there are extenuating circumstances or issue an

order withdrawing employees from the mine or affected area for the mine owner's failure to comply with the notice. Such withdrawals are commonly referred to as closure orders for noncompliance. The inspectors are also empowered to issue an order requiring the immediate withdrawal of employees from the affected area if they find an imminent danger condition that could reasonably be expected to cause death or serious physical harm before the hazard can be abated. These withdrawals are commonly referred to as closure orders for imminent danger.

The act further provides that any State desiring to develop and enforce health and safety standards for mines under the act submit a State plan to the Secretary of the Interior. The Secretary is authorized to approved such plans whenever the State gives satisfactory evidence of having met certain requirements specified in the act. As of October 31, 1975, six States had approved State Plan Agreements--Arizona, Colorado, New Mexico, New York, Utah, and Virginia. California rescinded its State Plan Agreement on February 15, 1975.

The States, under State Plan Agreements, are given the authority to issue notices of violations and otherwise enforce health and safety standards. The act requires, however, that the Secretary of the Interior, or his duly authorized representatives, inspect each underground mine in these States at least once a year and issue mine closure orders for the withdrawal of employees when Federal inspectors observe instances of imminent danger.

The act also prescribes procedures by which mine operators may appeal a closure order. Originally, an operator could appeal either directly to the Federal Metal and Non-metallic Mine Safety Board of Review--created by the act and composed of five members appointed by the President with the advice and consent of the Senate--or through the Secretary of the Interior. The Secretary and the Board of Review could annul, revise, or uphold an order. The Secretary's decision was based on findings of a reinspection of the mine by himself or three inspectors other than the inspector who issued the order. On the other hand, the Board of Review's decision was based on evidence presented to it by the parties involved during an independent hearing. Decisions of the Board were also subject to judicial review by the U.S. Circuit Court of Appeals whose decision was final, subject only to review by the Supreme Court. However, no closure orders were ever appealed to the Board.

On June 27, 1975, the Congress revised the appeals procedures by abolishing the Board of Review. Now mine operators can only appeal through the Board of Mine Operations Appeals within Interior's Office of Hearings and Appeals. The Office of Hearings and Appeals also handles coal mine operator's appeals. These cases can also ultimately be reviewed by the Court of Appeals.

At the request of the Chairman, Committee on Labor and Public Welfare, we obtained information on closure orders issued under the 1966 act. Mandatory health and safety standards promulgated under the act were published in the Federal Register on July 31, 1969, and became enforceable on July 31, 1970. From July 31, 1969, to September 1, 1975, a total of 4,624 closure orders were issued by Federal inspectors. Our analyses, presented below, cover the 4,562 orders issued since January 1, 1972. We did not analyze the 62 orders issued in calendar years 1970 and 1971 because MESA had not included these orders on its computerized Management Information System which was initiated in 1972, and the small number of orders involved was not considered important to the analyses.

DESCRIPTION OF CLOSURE ORDERS ISSUED

About 730 health and safety standards have been promulgated under the 1966 act--310 advisory standards and 420 mandatory standards. Closure orders, however, must be based on violations of the mandatory standards. We found that violation of 239 of the mandatory standards was cited as the reason for the 4,562 closure orders. Following is a cumulative summary of the closure orders by the number of standards violated.

<u>Number of standards</u>	<u>Number of orders</u>	<u>Type of order</u>			<u>Orders as a percent of total</u>
		<u>Imminent danger</u>	<u>Non-compliance</u>	<u>Not specified</u>	
5	1,733	905	749	79	38
10	2,490	1,267	1,081	142	55
15	2,958	1,496	1,290	172	65
20	3,253	1,650	1,411	192	71
25	3,424	1,722	1,499	203	75
35	3,667	1,837	1,609	221	80
50	3,908	1,954	1,721	233	86
75	4,155	2,116	1,787	252	91
100	4,309	2,199	1,850	260	94
239	4,562	2,353	1,925	284	100



As indicated above, 100 health and safety standards were the basis for 94 percent of the closure orders. The following table categorizes these 100 standards and shows the number of closure orders issued for violations in each category.

<u>Standard categories</u>	<u>Imminent danger</u>	<u>Noncompliance</u>	<u>Not specified</u>	<u>Total</u>
Ground control	770	111	73	954
Loading, hauling, and dumping	541	288	33	862
Use of equipment	89	527	28	644
Travelways and escapeways	114	431	34	579
Electricity	227	131	13	371
Personal protection	105	113	9	227
Explosives	122	79	17	218
Air quality, ventilation, radiation, and physical agents	114	39	29	182
Fire prevention and control	29	69	10	108
Man hoisting	38	3	9	50
Materials storage and handling	24	19	2	45
Safety programs	4	19	0	23
Compressed air and boilers	7	11	1	19
Miscellaneous	9	6	1	16
Drilling	2	3	1	6
Illumination	4	1	0	5
<b>Total,</b>	<b><u>2,199</u></b>	<b><u>1,850</u></b>	<b><u>260</u></b>	<b><u>4,309</u></b>

A detailed analysis of this data is presented in appendix I, and a description of the 100 standards is presented in appendix II.

The five standards most frequently cited follow.

<u>Standards cited</u>	<u>Total number of orders issued</u>	<u>Type of order</u>			<u>Orders as a percent of total issued</u>
		<u>Imminent danger</u>	<u>Non-compliance</u>	<u>Not specified</u>	
Inadequate guards on moving machine parts	550	23	502	25	12
Inadequate brakes on powered mobile equipment	369	335	26	8	8
Persons working near or under dangerous banks	313	270	34	9	7
Failure to examine and test ground conditions	279	223	33	23	6
Unsafe means of access to working places	<u>222</u>	<u>54</u>	<u>154</u>	<u>14</u>	<u>5</u>
<b>Total</b>	<b><u>1,733</u></b>	<b><u>905</u></b>	<b><u>749</u></b>	<b><u>79</u></b>	<b><u>38</u></b>

Orders for inadequate guards and unsafe access were issued primarily for noncompliance, whereas orders for the three other standards were issued primarily for imminent danger.

A small number of closure orders were issued for air quality, ventilation, radiation, and physical agents. As shown in the following schedule, 4 percent of the total orders were issued for violations of these health-related standards.

Total number of orders issued	Type of order			Orders as a percent of total issued	Standards cited
	Imminent danger	Noncompliance	Not specified		
126	90	14	22	2.8	Exposure to airborne contaminants
36	6	25	5	.8	Dust control during drilling
<u>20</u>	<u>18</u>	<u>0</u>	<u>2</u>	<u>.4</u>	Hazardous concentrations of radiation
Total <u>182</u>	<u>114</u>	<u>39</u>	<u>29</u>	<u>4.0</u>	

#### LENGTH AND EXTENT OF CLOSURE

At September 1, 1975, of the 4,562 closure orders 4,013 had been abated or withdrawn. The remaining 549 orders were still outstanding. Of the 4,013 closure orders, about 69 percent, or 2,753, were abated within 1 week after being issued and about 47 percent, or 1,899, were abated while the Federal inspectors were still on the mining properties. This included 61 percent of the imminent danger orders, 33 percent of the noncompliance orders, and 35 percent of the orders not specified as to the imminent danger or noncompliance. The following table summarizes the closure orders by length of time they were in effect.

Length of time closure order was in effect	Total orders issued	Type of order		
		Imminent danger	Non- compliance	Not spec- ified
Withdrawn	169	50	72	47
Abated during inspection	1,899	1,261	550	88
0 to 1 day	180	24	147	9
2 to 3 days	242	59	177	6
4 to 5 days	97	45	44	8
6 to 7 days	166	63	79	24
8 to 9 days	107	30	77	0
10 to 24 days	389	157	211	21
25 to 49 days	222	132	81	9
50 to 99 days	246	116	111	19
100 to 364 days	240	115	104	21
1 year or longer	56	32	21	3
Orders abated or withdrawn	4,013	2,084	1,674	255
Orders outstanding at 9/1/75	549	269	251	29
Total	<u>4,562</u>	<u>2,353</u>	<u>1,925</u>	<u>284</u>

Our analysis of closure orders issued in calendar year 1974, the only year for which such data was available, showed that about 5 percent of the orders resulted in closing an entire mine. About 39 percent of the orders closed a section of a mine; 43 percent withdrew unsafe equipment from operation; 11 percent involved personal protection violations, such as employees not wearing safety belts, life jackets, hard hats, and protective footwear; and 2 percent were not specified as to the extent of closure. The number of orders involved in each of these categories is shown below.

<u>Extent of closure</u>	<u>Number of orders issued</u>	<u>Percent of total orders</u>
Entire mine	95	5
Section of a mine	741	39
Piece of equipment	823	43
Other (personal protection violations, such as failure to wear safety belts, hard hats, etc.)	212	11
Not specified	<u>31</u>	<u>2</u>
Total	<u>1,902</u>	<u>100</u>

LOCATION AND NUMBER OF  
MINING OPERATIONS CITED

Two of MESA's 12 subdistricts, Birmingham and Dallas, accounted for about 45 percent, or 2,040, of the 4,562 closure orders. They accounted for about 39 percent of the imminent danger orders and 55 percent of the noncompliance orders. The following table summarizes the number of orders issued by each MESA district and subdistrict.

<u>MESA districts and subdistricts</u>	<u>Number of closure orders</u>	<u>Type of order</u>		
		<u>Imminent danger</u>	<u>Noncom- pliance</u>	<u>Not spec- ified</u>
North eastern district:				
Pittsburgh subdistrict	376	264	78	34
Albany subdistrict	<u>423</u>	<u>252</u>	<u>164</u>	<u>7</u>
Total	<u>799</u>	<u>516</u>	<u>242</u>	<u>41</u>
South eastern district:				
Birmingham subdistrict	1,239	352	829	58
Knoxville subdistrict	<u>150</u>	<u>74</u>	<u>69</u>	<u>7</u>
Total	<u>1,389</u>	<u>426</u>	<u>898</u>	<u>65</u>
North-central district:				
Duluth subdistrict	317	204	88	25
Vincennes subdistrict	<u>216</u>	<u>127</u>	<u>85</u>	<u>4</u>
Total	<u>533</u>	<u>331</u>	<u>173</u>	<u>29</u>
South-central district:				
Dallas subdistrict	801	565	228	8
Rolla subdistrict	<u>417</u>	<u>208</u>	<u>170</u>	<u>39</u>
Total	<u>1,218</u>	<u>773</u>	<u>398</u>	<u>47</u>
Rocky Mountain district:				
Denver subdistrict	149	76	20	53
Salt Lake City subdis- trict	<u>87</u>	<u>59</u>	<u>20</u>	<u>8</u>
Total	<u>236</u>	<u>135</u>	<u>40</u>	<u>61</u>
Western district:				
Phoenix subdistrict	199	79	92	28
Bellevue subdistrict	<u>188</u>	<u>93</u>	<u>82</u>	<u>13</u>
Total	<u>387</u>	<u>172</u>	<u>174</u>	<u>41</u>
Total	<u>4,562</u>	<u>2,353</u>	<u>1,925</u>	<u>284</u>

Of the 4,562 closure orders, about 58 percent, or 2,643, were issued in 9 States and 1 territory. They accounted for about 23 percent of the mining operations active in calendar year 1974 and locations where about 26 percent of the total injuries were reported in 1974.

Summary of Closure Orders by  
Groups of States and Territories

<u>Cumulative number of States and Territories</u>	<u>Cumulative number of closure orders</u>	<u>Orders as a percent of total</u>	<u>Active mining operations in calendar year 1974</u>	<u>Mining operations as a percent of total</u>	<u>Total number of injuries reported in calendar year 1974</u>	<u>Injuries as a percent of total</u>
5	1,638	36	1,605	11	1,874	12
10	2,643	58	3,406	23	3,999	26
15	3,169	70	4,974	34	5,422	36
20	3,562	78	5,822	39	6,209	41
25	3,858	85	7,762	52	7,587	50
30	4,086	90	9,528	64	9,036	60
52	4,562	100	14,847	100	15,158	100

A summary of the orders issued and mining operations cited in the nine States and one territory follows.

<u>State or territory</u>	<u>Number of orders issued</u>	<u>Type of order</u>			<u>Number of mining operations cited</u>	<u>Active mining operations in calendar year 1974</u>	<u>Total number of injuries reported in calendar year 1974</u>
		<u>Imminent danger</u>	<u>Non-compliance</u>	<u>Not specified</u>			
Tex.	403	284	118	1	137	471	448
Ala.	395	117	245	33	71	206	255
Puerto Rico	311	5	291	15	19	4	0
Pa.	278	196	64	18	105	423	451
Mo.	251	141	79	31	107	501	720
La.	238	175	63	0	54	154	233
Ga.	235	123	106	6	92	279	439
Mich.	217	150	55	12	32	575	693
Nev.	172	65	84	23	55	289	225
Ill.	143	100	40	3	49	504	535
Total	<u>2,643</u>	<u>1,356</u>	<u>1,145</u>	<u>142</u>	<u>721</u>	<u>3,406</u>	<u>3,999</u>

A list of 50 States and 2 territories by the number of closure orders issued by Federal inspectors is presented as appendix III. Only 269 of the 4,562 orders were issued in the States with State Plan Agreements, and these States tend to have noticeably fewer federally issued closure orders than do most non-State Plan States. In general, fewer orders are issued in the States with such agreements because a majority of the regular inspections are conducted by State inspectors and MESA can issue orders only for imminent danger. The 1966 act precludes MESA from issuing noncompliance orders in such States.

We found that the 4,562 closure orders were issued to 1,609 mining operations. As indicated in the following

table, about 22 percent of the orders were issued to 40 mining operations, about 33 percent to 83 operations, and about 52 percent to 222 operations.

Closure Orders by Number of Mining Operations Cited

<u>Cumulative number of mining operations</u>	<u>Cumulative number of closure orders</u>	<u>Orders as a percent of total</u>
15	528	11.6
22	681	14.9
40	985	21.6
83	1,481	32.5
222	2,367	51.9
1,609	4,562	100.0

A list of the 83 operations receiving about one-third of the closure orders is included as appendix IV. These operations accounted for 21 percent of the imminent danger orders and 47 percent of the noncompliance orders. The 222 mining operations that received over 50 percent of the closure orders accounted for about 38 percent of the imminent danger orders and 69 percent of the noncompliance orders.

TYPES AND SIZES OF MINING OPERATIONS CITED

The 222 mining operations that received over 50 percent of the closure orders, their locations, and the number and types of closure orders listed are shown in the following table.

<u>MESA subdistricts</u>	<u>Number of mining operations cited</u>	<u>Number of orders issued</u>	<u>Imminent danger</u>	<u>Noncom- pliance</u>	<u>Not spec- ified</u>
Birmingham	69	923	144	733	46
Dallas	43	404	260	143	1
Rolla, Mo.	20	178	51	119	8
Pittsburgh	18	158	95	43	20
Duluth, Minn.	16	231	137	71	23
Vincennes, Ind.	13	106	52	53	1
Phoenix	11	100	22	64	14
Albany	11	95	76	19	0
Knoxville	8	50	15	34	1
Denver	6	46	17	10	19
Bellevue, Wash.	5	39	7	29	3
Salt Lake City	2	33	21	9	3
Total	<u>222</u>	<u>2,363</u>	<u>897</u>	<u>1,327</u>	<u>139</u>

Of the 222 operations, about 50 percent, or 112 were located in the Birmingham and Dallas subdistricts. These operations accounted for about 56 percent of the closure orders issued to the 222 operations. Sixteen percent of the orders issued by the Birmingham subdistrict were for imminent danger violations.

The number of employees at 9 of the 222 mining operations could not be determined from MESA's computerized Management Control System. Of the remaining 213 operations, about 59 percent, or 126, had fewer than 20 employees. These operations accounted for about 58 percent, or 1,321, of the 2,257 closure orders issued to the 213 operations--35 percent of the imminent danger orders, 73 percent of the noncompliance orders, and 65 percent of those not specified. The following table summarizes the most frequently cited mining operations by employee size groups.

<u>Numbers of employees</u>	<u>Number of mining operations cited</u>	<u>Number of closure orders issued</u>	<u>Type of order</u>		
			<u>Immiment danger</u>	<u>Noncompliance</u>	<u>Not specified</u>
Not known	9	106	61	25	20
1 to 4	38	363	45	295	23
5 to 9	40	436	83	310	43
10 to 19	48	522	163	348	11
20 to 29	17	150	54	94	2
30 to 49	19	176	81	83	12
50 to 99	21	274	177	91	6
100 to 249	18	163	107	47	9
250 to 499	6	101	82	10	9
500 to 999	4	39	23	15	1
1,000 or more	<u>2</u>	<u>33</u>	<u>21</u>	<u>9</u>	<u>3</u>
Total	<u>222</u>	<u>2,363</u>	<u>897</u>	<u>1,327</u>	<u>139</u>

Of the 222 mining operations, about 54 percent, or 120, were limestone and sand and gravel. The 120 operations accounted for about 53 percent, or 1,246, of the 2,363 closure orders--29 percent of the imminent danger orders, 68 percent of the noncompliance orders, and 60 percent of those not specified. (See app. V.)

A summary of the most frequently cited mineral commodities by the number and size of mining operations cited is shown below. A summary of all 222 mining operations by mineral commodities and employee size groups is presented in appendix VI.

Minerals	Number of mining opera- tions cited	Employee size groups					
		1 to 9	10 to 19	20 to 49	50 to 99	100 or more	Not spe- cified
Limestone	61	21	13	16	5	6	0
Sand and gravel	59	41	9	6	2	0	1
Granite	9	2	3	3	1	0	0
Traprock	9	1	5	2	0	1	0
Salt	9	0	3	0	4	2	0
Total	<u>147</u>	<u>65</u>	<u>33</u>	<u>27</u>	<u>12</u>	<u>9</u>	<u>1</u>

CLOSURE ORDERS RESULTING  
FROM ACCIDENT INVESTIGATIONS

MESA's policy was to investigate each fatal accident to determine the circumstances and causes. In calendar year 1974 MESA expanded this policy to include serious nonfatal accidents. The nature and seriousness of the accident, rather than the degree of injury to the victim, is the determining factor as to which nonfatal accidents are investigated.

We found that, of the 4,562 closure orders, 91 were issued as a result of accident investigations. These investigations were conducted at 70 mining operations. We also analyzed the standard violations cited as the basis for the 91 orders. We found 11 instances in which violations had been cited during the regular inspections preceding the accidents. The time between the accident investigations and the preceding regular inspections ranged from 1 day to 26 months. The inspections for 66 of the 91 closure orders were conducted less than 4 months preceding the investigations and in 8 instances no inspections had been made.

A summary of the most frequently cited mining operations by mineral commodities is provided below. A summary of the entire 91 closure orders is presented in appendix VII.



<u>Minerals</u>	Number of mining operations cited	Number of orders issued	Instances in which standard violations were cited during previous regular <u>inspections</u>
Lead and zinc	13	19	2
Salt	6	6	1
Gold and silver	5	10	0
Limestone	5	6	0
Clay and shale	5	5	0
Sand and gravel	<u>5</u>	<u>5</u>	<u>0</u>
Total	<u>39</u>	<u>51</u>	<u>3</u>

CLOSURE ORDERS BY CATEGORIES  
AND TYPES OF STANDARDS FOR THE  
100 STANDARDS MOST FREQUENTLY VIOLATED (note a)

<u>Standard categories and types</u>	<u>Imminent danger</u>	<u>Non- compliance</u>	<u>Not specified</u>	<u>Total</u>
<b>Ground control:</b>				
Working near dangerous banks	270	34	9	313
Testing ground conditions	223	33	23	279
Using ground support where re- quired (underground only)	150	6	17	173
Stripping loose material	44	13	8	65
Establishing standards for control of pit walls	42	16	5	63
Scaling pit banks	20	5	4	29
Providing adequate bench widths and heights	5	1	4	10
Examining work areas and faces af- ter blasting	5	1	2	8
Miscellaneous	11	2	1	14
<b>Total</b>	<b>770</b>	<b>111</b>	<b>73</b>	<b>954</b>
<b>Loading, hauling, and dumping:</b>				
Providing adequate brakes	335	26	8	369
Correcting equipment defects before use	102	36	5	143
Providing stop devices on unguarded conveyors	5	115	6	126
Providing berms or guards on ele- vated roadways	33	60	10	103
Using safety glass or equivalent in cab windows	5	24	1	30
Riding outside cabs and beds	17	0	0	17
Keeping men clear of moving equip- ment	3	14	0	17
Preventing men from riding in dippers, shovel buckets, etc.	13	0	1	14
Preventing overtravel and overturn- ing at dumps	6	5	1	12
Trimming stockpile and muckpile faces	7	1	1	9
Keeping men clear of conveyors be- fore starting	1	7	0	8
Securing dippers, buckets, etc.	5	0	0	5
Miscellaneous	9	0	0	9
<b>Total</b>	<b>541</b>	<b>288</b>	<b>33</b>	<b>862</b>

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<u>Standard categories and types</u>	<u>Imminent danger</u>	<u>Non- compliance</u>	<u>Not specified</u>	<u>Total</u>
<b>Use of equipment:</b>				
Providing guards on moving machine parts	23	502	25	550
Removing unsafe equipment from service	24	0	1	25
Providing hoods on stationary grinding wheels	2	15	1	18
Blocking mobile equipment	16	0	1	17
Keeping guards on machines in place	9	8	0	17
Turning power off before repairs or maintenance	10	1	0	11
Miscellaneous	<u>5</u>	<u>1</u>	<u>0</u>	<u>6</u>
<b>Total</b>	<b><u>89</u></b>	<b><u>527</u></b>	<b><u>28</u></b>	<b><u>644</u></b>
<b>Travelways and escapeways:</b>				
Providing safe access to working places	54	154	14	222
Providing safe crossovers, stairways, elevated ramps, etc.	15	161	13	189
Protecting openings above, below, or near travelways	21	73	4	98
Providing adequate scaffolds and working platforms	3	19	1	23
Providing two escapeways or method of refuge	7	8	2	17
Providing fixed ladders or hand-holds above landings	0	8	0	8
Inspecting, marking, and maintaining escapeways	4	3	0	7
Providing safe ladders	0	5	0	5
Miscellaneous	<u>10</u>	<u>0</u>	<u>0</u>	<u>10</u>
<b>Total</b>	<b><u>114</u></b>	<b><u>431</u></b>	<b><u>34</u></b>	<b><u>579</u></b>
<b>Electricity:</b>				
Correcting dangerous conditions before equipment or wiring is energized	94	18	3	115
Deenergizing electrical equipment before work is done on it	69	12	4	85
Grounding metal enclosed or encased electrical circuits	16	33	0	49
Using secured inspection and cover plates on electrical equipment and junction boxes	6	12	0	18
Providing safe footing near switchboards	2	14	1	17
Labeling power switches	0	16	1	17
Providing danger signs near electrical installations	0	10	3	13
Providing switches on electrical equipment and circuits	7	6	0	13
Deenergizing power circuits before working on them	6	2	1	9
Using fuses and circuit breakers to prevent overloads	7	1	0	8
Operating equipment near high-voltage powerlines	6	0	0	6
Guarding uninsulated connections and grids	0	6	0	6
Miscellaneous	<u>14</u>	<u>1</u>	<u>0</u>	<u>15</u>
<b>Total</b>	<b><u>227</u></b>	<b><u>131</u></b>	<b><u>13</u></b>	<b><u>371</u></b>

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<u>Standard categories and types</u>	<u>Imminent danger</u>	<u>Non-compliance</u>	<u>Not specified</u>	<u>Total</u>
<b>Explosives:</b>				
Assuring safe location and construction and maintenance of magazines	12	46	9	67
Storing detonators and explosives in magazines	29	5	1	35
Reporting and disposing of misfires	8	1	3	12
Providing safe vehicles for transporting explosives	5	7	0	12
Drilling holes intersecting a charged or misfired hole	10	0	1	11
Disposing of damaged explosives and detonators	9	1	1	11
Separating detonators and explosives	11	0	0	11
Disposing of misfired holes	6	1	2	9
Providing for separate transportation of detonators and explosives	8	1	0	9
Providing clearance around magazines	1	8	0	9
Guarding holes awaiting firing	8	0	0	8
Providing fire extinguishers on vehicles transporting explosives and detonators	3	4	0	7
Taking vehicles containing explosives and detonators to repair shops	6	0	0	6
Warning signs on vehicles carrying explosives and detonators	2	4	0	6
Moving explosives and detonators after charging operation	<u>4</u>	<u>1</u>	<u>0</u>	<u>5</u>
<b>Total</b>	<b><u>122</u></b>	<b><u>79</u></b>	<b><u>17</u></b>	<b><u>218</u></b>
<b>Personal protection:</b>				
Using safety belts and lines to prevent falls	51	12	3	66
Providing readily available first aid materials	1	47	4	52
Wearing life jackets or belts near water	32	8	0	40
Wearing safety glasses, goggles, etc.	9	17	1	27
Wearing hard hats	9	13	0	22
Wearing protective footwear	<u>3</u>	<u>16</u>	<u>1</u>	<u>20</u>
<b>Total</b>	<b><u>105</u></b>	<b><u>113</u></b>	<b><u>9</u></b>	<b><u>227</u></b>
<b>Air quality, ventilation, radiation, and physical agents:</b>				
Limiting exposure to airborne contaminants to permissible levels	90	14	22	126
Controlling dust during drilling	6	25	5	36
Limiting concentrations of radon daughters to permissible levels	<u>18</u>	<u>0</u>	<u>2</u>	<u>20</u>
<b>Total</b>	<b><u>114</u></b>	<b><u>39</u></b>	<b><u>29</u></b>	<b><u>182</u></b>

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<u>Standard categories and types</u>	<u>Imminent danger</u>	<u>Non-compliance</u>	<u>Not specified</u>	<u>Total</u>
<b>Fire prevention and control:</b>				
Providing adequate firefighting equipment	0	26	4	30
Posting no smoking signs near fire hazards	1	26	3	30
Providing safe storage of flammable liquids	6	3	0	9
Storing gasoline underground and lining roadways and openings with combustible material	3	3	2	8
Prohibiting smoking and using open flames near flammable materials	5	2	0	7
Storing oxygen cylinders in rooms designated for oil and grease	3	3	0	6
Deenergizing abandoned electrical circuits	1	4	1	6
Miscellaneous	<u>10</u>	<u>2</u>	<u>0</u>	<u>12</u>
<b>Total</b>	<u>29</u>	<u>69</u>	<u>10</u>	<u>108</u>
<b>Man hoisting:</b>				
Testing shaft and hoisting equipment	21	2	3	26
Providing devices to prevent hoist overtravel	5	1	4	10
Using safe ropes for hoisting	8	0	0	8
Miscellaneous	<u>4</u>	<u>0</u>	<u>2</u>	<u>6</u>
<b>Total</b>	<u>38</u>	<u>3</u>	<u>9</u>	<u>50</u>
<b>Materials storage and handling:</b>				
Securing compressed and liquid gas cylinders	7	12	2	21
Preventing liberation of hazardous materials in containers	15	1	0	16
Protecting valves on compressed gas cylinders	<u>2</u>	<u>6</u>	<u>0</u>	<u>8</u>
<b>Total</b>	<u>24</u>	<u>19</u>	<u>2</u>	<u>45</u>
<b>Safety programs:</b>				
Providing first aid training	0	7	0	7
Posting emergency telephone numbers	0	6	0	6
Safeguarding men working alone in hazardous areas	4	1	0	5
Providing emergency medical assistance and transportation	<u>0</u>	<u>5</u>	<u>0</u>	<u>5</u>
<b>Total</b>	<u>4</u>	<u>19</u>	<u>0</u>	<u>23</u>
<b>Compressed air and boilers:</b>				
Providing shutoff devices for high-pressure hose lines	2	11	1	14
Assuring safe use of compressed air	<u>5</u>	<u>0</u>	<u>0</u>	<u>5</u>
<b>Total</b>	<u>7</u>	<u>11</u>	<u>1</u>	<u>19</u>
Miscellaneous	<u>9</u>	<u>6</u>	<u>1</u>	<u>16</u>
<b>Drilling:</b>				
Correcting equipment defects before use	<u>2</u>	<u>3</u>	<u>1</u>	<u>6</u>
<b>Illumination:</b>				
Providing adequate illumination in all areas	<u>4</u>	<u>1</u>	<u>0</u>	<u>5</u>
<b>Total</b>	<u>2,199</u>	<u>1,850</u>	<u>260</u>	<u>4,309</u>

a/The 100 health and safety standards that were the basis for 94 percent of the closure orders.

DESCRIPTION OF THE 100 STANDARD VIOLATIONSMOST FREQUENTLY CITED AS REASONSFOR CLOSURE ORDERS (note a)

<u>Stand-</u> <u>ard</u> <u>number</u>	<u>Standard</u> <u>category</u>	Percent of <u>closure</u> <u>orders</u>	<u>Total</u> <u>orders</u> <u>issued</u>	<u>Immi-</u> <u>nent</u> <u>danger</u>	<u>Non-</u> <u>compli-</u> <u>ance</u>	<u>Not</u> <u>speci-</u> <u>fied</u>
1.	.14-1 Use of equipment	12.1	550	23	502	25
	Gears; sprockets; chains; drive, head, tail, and takeup pulleys; flywheels; couplings; shafts; sawblades; fan inlets; and similar exposed moving machine parts which may be contacted by persons and which may cause injury to persons; shall be guarded.					
	Application: Guards are to be so constructed and so positioned that persons cannot contact moving machine parts.					
2.	.9-3 Loading, hauling, and dumping	8.1	369	335	26	8
	Powered mobile equipment shall be provided with adequate brakes.					
	Application: "Adequate brakes" means brakes capable of stopping and holding a fully loaded vehicle on the maximum grade traveled.					
3.	.3-5 Ground control	6.9	313	270	34	9
	Workers shall not work near or under dangerous banks. Overhanging banks shall be taken down immediately and other unsafe ground conditions shall be corrected promptly or the areas shall be barricaded and posted.					
4.	.3-22 Ground control	6.1	279	223	33	23

Miners shall examine and test the back, face, and ribs of their working places at the beginning of each shift and frequently thereafter. Supervisors shall examine the

<u>Stand- ard number</u>	<u>Standard category</u>	Percent of <u>closure orders</u>	<u>Total orders issued</u>	<u>Immi- nent danger</u>	<u>Non- compli- ance</u>	<u>Not speci- fied</u>
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ground conditions during daily visits to insure that proper testing and ground control practices are being followed. Loose ground shall be taken down or adequately supported before any other work is done. Ground conditions along haulageways and travelways shall be examined periodically and scaled or supported as necessary.

5.	.11-1 Travelways and escapeways	4.9	222	54	154	14
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Safe means of access shall be provided and maintained to all working places.

6.	.11-2 Travelways and escapeways	4.1	189	15	161	13
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Crossovers, elevated walkways, elevated ramps, and stairways shall be of sturdy construction, provided with handrails, and maintained in good condition. Where necessary, toeboards shall be provided.

7.	.3-20 Ground control-- underground only	3.8	173	150	6	17
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Ground support shall be used if the operating experience of the mine, or any particular area of the mine, indicates that it is required. If it is required, support--including timbering, rock bolting, or other methods--shall be consistent with the nature of the ground and the mining method used.

Application: If, in the inspector's judgment, ground control is inadequate, he shall call for additional ground support. If the inspector finds a difficult problem, it should be brought to the attention of his supervisor for further evaluation by the Technical Support Group.

<u>Stand- ard number</u>	<u>Standard category</u>	<u>Percent of closure orders</u>	<u>Total orders issued</u>	<u>Immi- nent danger</u>	<u>Non- compli- ance</u>	<u>Not speci- fied</u>
8. .9-2	Loading, hauling, and dumping	3.1	143	102	36	5

Equipment defects affecting safety shall be corrected before the equipment is used.

9. .9-7	Loading, hauling, and dumping	2.8	126	5	115	6
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Unguarded conveyors with walkways shall be equipped with emergency stop devices or cords along their full length.

Application: A sturdy handrail, instead of a guard, on the belt side of walkway can be acceptable. Walkway in the standard is a regular travelway immediately adjacent to the conveyor.

10. .5-1	Air quality, ventilation, radiation, and physical agents	2.8	126	90	14	22
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Except as permitted by section 57.5-5:

- a. Except as provided in paragraph b, the exposure to airborne contaminants shall not exceed, on the basis of a time weighted average, the threshold limit values adopted by the American Conference of Governmental Industrial Hygienists, as set forth and explained in the 1973 edition of the Conference's publication, entitled "TLV's Threshold Limit Values for Chemical Substances in Workroom Air Adopted by ACGIH for 1973," pages 1 through 54, which are hereby incorporated by reference and made a part hereof.



<u>Stand- ard number</u>	<u>Standard category</u>	<u>Percent of closure orders</u>	<u>Total orders issued</u>	<u>Immi- nent danger</u>	<u>Non- compli- ance</u>	<u>Not speci- fied</u>
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b. The 8-hour time weighted average airborne concentration of asbestos dust to which employees are exposed shall not exceed 5 fibers per milliliter greater than 5 microns in length, as determined by the membrane filter method at 400 to 450 magnification (4 millimeter objective) phase contrast illumination. No employee shall be exposed at any time to airborne concentrations of asbestos fibers in excess of 10 fibers longer than 5 micrometers, per milliliter of air, as determined by the membrane filter method over a minimum sampling time of 15 minutes. "Asbestos" is a generic term for a number of hydrated silicates that, when crushed or processed, separate into flexible fibers made up of fibrils.

c. Employees shall be withdrawn from areas where there is an airborne contaminant given a "C" designation by the Conference and where the concentration exceeds the threshold limit value listed for that contaminant.

11.	.12-30	Electricity	2.5	115	94	18	3
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When a potentially dangerous condition is found, it shall be corrected before equipment or wiring is energized.

12.	.9-22	Loading, hauling, and dumping	2.3	103	33	60	10
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Berms or guards shall be provided on the outer bank of elevated roadways.

Application: "Roadways" means active roadways. "Elevated" means those roadways which have a dropoff on one or both sides. The purpose of berms or guardrails is to restrain vehicles from dropping down hazardous embankments.

Berms shall be at least as high as the midaxle height of the largest vehicle using the roadway. They need not be continuous where drainage and snow removal may constitute a problem.

Guards of posts and railings shall be substantially equivalent as a restraining medium as berms of earth or waste rock.

<u>Stand- ard number</u>	<u>Standard category</u>	<u>Percent of closure orders</u>	<u>Total orders issued</u>	<u>Immi- nent danger</u>	<u>Non- compli- ance</u>	<u>Not speci- fied</u>
13. .11-12	Travelways and escapeways	2.1	98	21	73	4

Openings above, below, or near travelways through which men or materials may fall shall be protected by railings, barriers, or covers. Where it is impracticable to install such protective devices, adequate warning signals shall be installed.

14. .12-16	Electricity	1.9	85	69	12	4
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Electrical equipment shall be deenergized before work is done on such equipment. Switches shall be locked out or other measures taken which shall prevent the equipment from being energized without the knowledge of the individuals working on it. Such locks, or preventative devices, shall be removed only by persons who install them or by authorized personnel.

Application: This standard requires a lockout or other preventative system, such as disconnecting leads where lockouts are not practicable. A tagout system only is not acceptable as it is not preventative. A tag, in addition to a lockout system, is highly desirable as a notice that work is being done on the equipment.

15. .6-20	Explosives	1.5	67	12	46	9
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Magazines shall be:

- a. Located in accordance with the current American Table of Distances for storage of explosives.
- b. Detached structures located away from powerlines, fuel storage areas, and other possible sources of fire.
- c. Constructed substantially of noncombustible material or covered with fire-resistant material.
- d. Reasonably bullet resistant.
- e. Electrically bonded and grounded if constructed of metal.

<u>Stand-</u> <u>ard</u> <u>number</u>	<u>Standard</u> <u>category</u>	Percent of <u>closure</u> <u>orders</u>	Total <u>orders</u> <u>issued</u>	Immi- nent <u>danger</u>	Non- compli- <u>ance</u>	Not speci- <u>fied</u>
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- f. Made of nonsparking materials on the inside, including floors.
- g. Provided with adequate and effectively screened ventilation openings near the floor and ceiling.
- h. Kept locked securely when unattended.
- i. Posted with suitable danger signs so located that a bullet passing through the face of a sign will not strike the magazine.
- j. Used exclusively for storage of explosives or detonators and kept free of all extraneous materials.
- k. Kept clean and dry in the interior, and in good repair.
- l. Unheated, unless heated in a manner that does not create a fire or explosion hazard. Electrical heating devices shall not be used inside a magazine.

Application:

- a. Not explained.
- b. Magazines shall be located a sufficient distance away from powerlines so the danger of contact with magazines, should the line break or be blown down, is minimized. Magazines should be located a minimum of 25 feet from possible sources of fire.
- c. Fire-retardant paint and chemically treated wood do not provide enough fire-resistance for exterior surfaces of magazines.
- d. Provisions for bullet resistance are spelled out on page 460 of the Blasters' Handbook, 15th edition. Inspector should use judgment as to the applicability of the recommendations in the Blasters' Handbook.
- e. "Electrically bonded" means all pieces are tied together electrically.

<u>Stand- ard number</u>	<u>Standard category</u>	<u>Percent of closure orders</u>	<u>Total orders issued</u>	<u>Immi- nent danger</u>	<u>Non- compli- ance</u>	<u>Not speci- fied</u>
	f. Nails, screws, bolts, or other metal fasteners, shall be countersunk or covered with nonsparking material.					
	g. Screening should be adequate to keep out rodents and snakes.					
16. .15-5	Personal protection	1.4	66	51	12	3

Safety belts and lines shall be worn by workers where there is danger of falling; a second person shall tend the lifeline when bins, tanks, or other dangerous areas are entered.

17. .3-2	Ground control	1.4	65	44	13	8
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Loose, unconsolidated material shall be stripped for a safe distance, but in no case less than 10 feet, from the top of pit or quarry walls, and the loose, unconsolidated material shall be sloped to the angle of repose.

18. .3-1	Ground control	1.4	63	42	16	5
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Standards for the safe control of pit walls, including the overall slope of the pit wall, shall be established and followed by the operator. Such standards shall be consistent with prudent engineering design, the nature of the ground and the kind of material and mineral mined, and the insuring of safe working conditions according to the degree of slope. Mining methods shall be selected which will insure wall and bank stability, including benching, as necessary to obtain a safe overall slope.

Application: It is the responsibility of the operator to demonstrate that standards have been established, the effectiveness of the standards, and that such standards are being followed. Such may be demonstrated or shown by observing past or present methods of mining and experience; by a written outline, plans, drawings, maps, diagrams; or by conferences with the inspector.

<u>Stand- ard number</u>	<u>Standard category</u>	<u>Percent of closure orders</u>	<u>Total orders issued</u>	<u>Immi- nent danger</u>	<u>Non- compli- ance</u>	<u>Not speci- fied</u>
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The inspector should evaluate the standards with regard to the operations to which they pertain. When an inspector finds a difficult problem, it should be brought to the attention of his supervisor for considering further evaluation by the Technical Support Group. A maximum bench height cannot be set which safely meets all possible conditions. Each operation must be treated separately.

19.	.15-1	Personal protection	1.1	52	1	47	4
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Adequate first-aid materials, including stretchers and blankets, shall be provided at places convenient to all working areas. Water or neutralizing agents shall be available where corrosive chemicals or other harmful substances are stored, handled, or used.

Application: "Adequate" includes sufficient first-aid materials to at least properly immobilize a fractured neck and transport the victim.

20.	.12-25	Electricity	1.1	49	16	33	0
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All metal enclosing or encasing electrical circuits shall be grounded or provided with equivalent protection. This requirement does not apply to battery-operated equipment.

21.	.15-20	Personal protection	0.9	40	32	8	0
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Life jackets or belts shall be worn when there is danger of falling into water.

Application: This standard is to be applied when there is the possibility of drowning.

22.	.5-3	Air quality, ventilation, radiation, and physical agents	0.8	36	6	25	5
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<u>Stand-</u> <u>ard</u> <u>number</u>	<u>Standard</u> <u>category</u>	Percent of <u>closure</u> <u>orders</u>	Total <u>orders</u> <u>issued</u>	Immi- nent <u>danger</u>	Non- compli- <u>ance</u>	Not speci- <u>fied</u>
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Holes shall be collared and drilled wet or other efficient dust-control measures shall be used when drilling non-water-soluble material. Efficient dust-control measures shall be used when drilling water-soluble materials.

Application: Standards 55, 56, and 57.5-3 shall be cited whenever dry drilling is conducted in the absence of dust-control measures. A small number of cases have been observed where dry drilling has been conducted without dust control and where airborne dust concentrations are below the Threshold Limit Values. These few situations may be handled by variances if wet drilling or dust collection is impracticable. The burden of proof is on the operator to show that exposures are, and will remain, below the Threshold Limit Values whenever a variance is requested. Dust sampling by Bureau of Mines personnel should be done to verify the operators's claims before granting the variance. A condition of the variance should be that subsequent dust sampling will be conducted by the operator on a regular basis to insure that conditions remain in compliance with Standards 55, 56, and 57.5-1.

23.	.6-1	Explosives	0.8	35	29	5	1
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Detonators and explosives other than blasting agents shall be stored in magazines...

24.	.9-11	Loading, hauling, and dumping	0.7	30	5	24	1
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Cab windows shall be of safety glass or equivalent, in good condition, and kept clean.

Application: This standard does not require windows in cabs. "Clean" means enough vision to allow safe operation.

	<u>Stand- ard number</u>	<u>Standard category</u>	Percent of <u>closure orders</u>	Total <u>orders issued</u>	Immi- nent <u>danger</u>	Non compli- <u>ance</u>	Not speci- <u>fied</u>
25.	.4-22	Fire pre- vention and con- trol	0.7	30	0	26	4

Each mine shall have available, or be provided with, suitable fire fighting equipment adequate for the size of the mine.

Application: "Have available" does not necessarily mean actual ownership. "Suitable" means that the nature and classification of the combustibles present and the flammable materials involved must be considered. "Adequate" means sufficient for protection of life should a fire occur. Enough equipment and facilities to cope with incipient fires and to limit fires shall be provided so that withdrawal or escape of personnel is insured. As a minimum, fire extinguishers or equivalent shall be provided within 75 feet of the area or equipment that requires protection. Such extinguishers shall meet the fire classification and minimum rating requirements of the National Fire Protection Association.

26.	.4-2	Fire pre- vention and con- trol	0.7	30	1	26	3
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Signs warning against smoking and open flames shall be posted so they can be readily seen in areas or places where fire or explosion hazards exist.

Application: This applies to explosives-magazines and battery-charging stations as well as those areas covered under the "No Smoking" requirements of 55, 56, and 57.4-1. "Fire hazards" as used here does not refer to hazards that can be eliminated by removal of the material constituting the hazard; it does refer to areas or places where the risk of fire is increased by the combustible nature of the materials permanently or normally kept or stored in such places or areas where the quantity involved could, if ignited, develop heat, smoke, toxic gases, or other effects harmful to man or the mine environment.

<u>Stand- ard number</u>	<u>Standard category</u>	<u>Percent of closure orders</u>	<u>Total orders issued</u>	<u>Immi- nent danger</u>	<u>Non- compli- ance</u>	<u>Not speci- fied</u>
27. .3-4	Ground control	0.6	29	20	5	4

Safe means for scaling pit banks shall be provided. Hazardous banks shall be scaled before other work is done in the area.

Application: "Safe means" includes mechanical devices, such as shovel dippers, and manual scaling.

28. .15-4	Personal protec- tion	0.6	27	9	17	1
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All persons shall wear safety glasses, goggles, or face shields or other suitable protective devices when in or around an area of a mine or plant where a hazard exists which could cause injury to unprotected eyes.

29. .19-120	Man hoisting	0.6	26	21	2	3
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A systematic procedure of inspection, testing, and maintenance of shaft and hoisting equipment shall be developed and followed. If it is found or suspected that any part is not functioning properly, the hoist shall not be used until the malfunction has been located and repaired or adjustments have been made.

Application: The inspection shall include examination and measurements, especially on ropes and head sheaves.

30. .14-26	Use of equipment	0.5	25	24	0	1
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Unsafe equipment or machinery shall be removed from service immediately.

31. .11-27	Travel- ways and escapeways	0.5	23	3	19	1
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Scaffolds and working platforms shall be of sturdy construction and provided with handrails and maintained in



<u>Stand-</u> <u>ard</u> <u>number</u>	<u>Standard</u> <u>category</u>	<u>Percent</u> <u>of</u> <u>closure</u> <u>orders</u>	<u>Total</u> <u>orders</u> <u>issued</u>	<u>Immi-</u> <u>nent</u> <u>danger</u>	<u>Non-</u> <u>compli-</u> <u>ance</u>	<u>Not</u> <u>speci-</u> <u>fied</u>
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good condition. Floorboards shall be laid properly, and the scaffolds and working platform shall not be overloaded. Working platforms shall be provided with toeboards when necessary.

32.	.15-2	Personal protection	0.5	22	9	13	0
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All persons shall wear suitable hard hats when in or around a mine or plant where falling objects may create a hazard.

33.	.16-5	Materials storage and handling	0.5	21	7	12	2
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Compressed and liquid gas cylinders shall be secured in a safe manner.

Application: "Safe manner" means securely fastened in an upright position.

34.	.15-3	Personal protection	0.4	20	3	16	1
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All persons shall wear suitable protective footwear when in or around an area of a mine or plant where a hazard exists which could cause an injury to the feet.

35.	.5-39	Air quality, ventilation, radiation, and physical agents	0.4	20	18	0	2
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If samples show an atmospheric concentration of radon daughters of more than 1.0 working level but less than 2.0 working levels, immediate corrective action shall be taken or the workers shall be withdrawn. When

<u>Stand-</u> <u>ard</u> <u>number</u>	<u>Standard</u> <u>category</u>	Percent of <u>closure</u> <u>orders</u>	Total <u>orders</u> <u>issued</u>	Immi- nent <u>danger</u>	Non- compli- <u>ance</u>	Not speci- <u>fied</u>
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concentrations higher than 2.0 working levels are found, the workers shall be withdrawn from the area until corrective action is taken and the radon-daughter atmospheric concentrations are reduced to 1.0 working level or less.

Application: Notices shall be issued against Standard 57.5-39 whenever the concentration exceeds 1 working level. The notice shall remain in effect until the concentration is decreased below 1 working level or until the time for abatement has expired, at which time an order may be issued or the time extended.

This standard applies to any mine and shall be cited whenever concentrations of radon daughters are in excess of those stated.

36.	.14-8	Use of equipment	0.4	18	2	15	1
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Stationary grinding machines, other than special bit grinders, shall be equipped with:

- a. Peripheral hoods (less than 90° throat openings) capable of withstanding the force of a bursting wheel.
- b. Adjustable tool rests set as close as practicable to the wheel.
- c. Safety washers.

Application: "As close as practicable" is interpreted to mean not more than one-eighth of an inch.

37.	.12-32	Electricity	0.4	18	6	12	0
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Inspection and cover plates on electrical equipment and junction boxes shall be kept in place at all times, except during testing or repairs.

<u>Stand- ard number</u>	<u>Standard category</u>	<u>Percent of closure orders</u>	<u>Total orders issued</u>	<u>Immi- nent danger</u>	<u>Non- compli- ance</u>	<u>Not speci- fied</u>
38. .14-30	Use of equipment	0.4	17	16	0	1

Workers shall not work on or from a piece of mobile equipment in a raised position until it has been blocked in place securely. This does not preclude the use of equipment specifically designed as elevated mobile work platforms.

39. .14-6	Use of equipment	0.4	17	9	8	0
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Except when testing the machinery, guards shall be securely in place while machinery is being operated.

Application: Guards are to be removed only when necessary to adequately test or adjust the operating machinery. If adequate testing or adjustments can be done with guards in place, they are not to be removed.

40. .12-20	Elec- tricity	0.4	17	2	14	1
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Dry wooden platforms, insulating mats, or other electrically nonconductive material shall be kept in place at all switchboards and power-control switches where shock hazards exist. However, metal plates on which a person normally would stand and which are kept at the same potential as the grounded, metal, non-current-carrying parts of the power switches to be operated may be used.

41. .12-18	Elec- tricity	0.4	17	0	16	1
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Principal power switches shall be labeled to show which units they control, unless identification can be made readily by location.

	<u>Stand- ard number</u>	<u>Standard category</u>	<u>Percent of closure orders</u>	<u>Total orders issued</u>	<u>Immi- nent danger</u>	<u>Non- compli- ance</u>	<u>Not speci- fied</u>
42.	.11-50	Travelways and escapeways	0.4	17	7	8	2

Every mine shall have two separate properly maintained escapeways to the surface which are so positioned that damage to one shall not lessen the effectiveness of the other, or a method of refuge shall be provided when only one opening to the surface is possible.

Application: Refuge chambers shall be required under this standard during mine development or during the period that work toward a second exit is in progress.

43.	.9-43	Loading, hauling, and dumping	0.4	17	17	0	0
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Workers shall not ride outside the cabs and beds of mobile equipment.

Application: Standard does not apply to trains.

44.	.9-5	Loading, hauling, and dumping	0.4	17	3	14	0
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Operators shall be certain, by signal or some other means, that all persons are clear before starting or moving equipment.

45.	.16-3	Materials storage and handling	0.4	16	15	1	0
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Materials that can create hazards if accidentally liberated from their containers shall be stored in a manner that minimizes the dangers.

	<u>Stand- ard number</u>	<u>Standard category</u>	<u>Percent of closure orders</u>	<u>Total orders issued</u>	<u>Immi- nent danger</u>	<u>Non- compli- ance</u>	<u>Not speci- fied</u>
46.	.12-0	Elec- tricity	0.3	15	14	1	0

These closure orders could not be further identified as to specific section of the standards.

47.	.13-21	Compressed air and boilers	0.3	14	2	11	1
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Except where automatic shutoff valves are used, safety chains or other suitable locking devices shall be used at connections to machines of high-pressure hose lines of three-fourths inch inside diameter or larger and between high-pressure hose lines of three-fourths inch inside diameter or larger, where connection failure would create a hazard.

Application: "High pressure" is that pressure sufficient to whip an unrestrained hose.

48.	.9-33	Loading, hauling, and dumping	0.3	14	13	0	1
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Workers shall not ride in dippers, shovel buckets, forks, clamshells, or in the beds of ore-hauling trucks for the purpose of transportation.

49.	.3-0	Ground control	0.3	14	11	2	1
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These closure orders could not be further identified as to specific section of the standards.

50.	.12-21	Elec- tricity	0.3	13	0	10	3
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Suitable danger signs shall be posted at all major electrical installations.

Application: "Major electrical installations" means transformer stations, generator rooms, substations, distribution centers, and other similar installations.

<u>Stand- ard number</u>	<u>Standard category</u>	<u>Percent of closure orders</u>	<u>Total orders issued</u>	<u>Immi- nent danger</u>	<u>Non- compli- ance</u>	<u>Not speci- fied</u>
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Signs with the word "Danger" and any additional wording will be acceptable, i.e., "Danger: Authorized Persons Only."

51.	.12-2	Elec- tricity	0.3	13	7	6	0
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Electric equipment and circuits shall be provided with switches or other controls. Such switches or controls shall be of approved design and construction and shall be properly installed.

52.	.9-54	Loading, hauling, and dumping	0.3	12	6	5	1
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Berms, bumper blocks, safety hooks, or similar means shall be provided to prevent overtravel and overturning at dumping locations.

Application: Use axle height as a guideline if the truck is able to dump. A somewhat lower berm or block will be acceptable if it is needed to clear taillights, etc.

53.	.6-168	Explosives	0.3	12	8	1	3
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Misfires shall be reported to the proper supervisor and shall be disposed of safely before any other work is performed in that blasting area.

54.	.6-47	Explosives	0.3	12	5	7	0
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Vehicles used to transport explosives, other than blasting agents, shall have well constructed bodies, no sparking metal exposed in the cargo space, and shall be equipped with suitable sides and tailgates; explosives shall not be piled higher than the side or end enclosures.

Application: Standard wooden pallets are acceptable for palletizing explosives, provided that the explosives are secured to the pallet. Palletized explosives, other than blasting agents, shall be transported in accordance with the provisions of this standard.

	<u>Stand- ard number</u>	<u>Standard category</u>	<u>Percent of closure orders</u>	<u>Total orders issued</u>	<u>Immi- nent danger</u>	<u>Non- compli- ance</u>	<u>Not speci- fied</u>
55.	.4-0	Fire pre- vention and con- trol	0.3	12	10	2	0

These closure orders could not be further identified as to specific section of the standards.

56.	.14-29	Use of equipment	0.2	11	10	1	0
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Repairs or maintenance shall not be performed on machinery until the power is off and the machinery is blocked against motion, except where machinery motion is necessary to make adjustments.

57.	.6-107	Explosives	0.2	11	10	0	1
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Holes shall not be drilled where there is danger of intersecting a charged or misfired hole.

Application: This standard prohibits drilling in bootlegs (holes caused by a blast that has failed to shatter the rock properly). Bootlegs may contain undetonated explosives or a film of explosive which may be detonated by the drill bit. A bootleg may be present in the face after blasting.

58.	.6-92	Explosives	0.2	11	9	1	1
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Damaged or deteriorated explosives or detonators shall be destroyed in a safe manner.

Application: Detailed instructions for destroying explosives or detonators are covered in the Blasters' Handbook, 15th edition. Explosives or detonators, to be destroyed, will be stored only until there is a reasonably good opportunity to dispose of them.

59.	.6-2	Explosives	0.2	11	11	0	0
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Detonators shall not be stored in the same magazine with explosives.

<u>Stand- ard number</u>	<u>Standard category</u>	<u>Percent of closure orders</u>	<u>Total orders issued</u>	<u>Immi- nent danger</u>	<u>Non- compli- ance</u>	<u>Not speci- fied</u>
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Application: Detonating cord delay connectors have explosive charges similar to those in electric blasting caps and, therefore, shall not be stored in the same magazine with explosives.

60.	.19-7 Man hoisting	0.2	10	5	1	4
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All man hoists shall be provided with devices to prevent overtravel. When used in shafts exceeding 100 feet in depth, such hoists shall also be provided with overspeed devices.

61.	.11-0 Travel- ways and escape- ways	0.2	10	10	0	0
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These closure orders could not be further identified for specific section of the standards.

62.	.3-3 Ground control	0.2	10	5	1	4
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To insure safe operation, the width and height of benches shall be governed by the type of equipment to be used and the operation to be performed.

Application: This standard is designed to provide bench widths that will furnish a degree of safety to workers on a bench from falling or rolling rocks. Insufficient width of benches also present a hazard to employees from falls over the bank. Where power shovels are used, they often are worked at right angles to the face and narrow benches may require maneuvering the shovel, as well as other equipment, too near the edge of the bank.

A maximum bench height cannot be set which safely meets all possible conditions. Each operation must be treated separately.



<u>Stand- ard number</u>	<u>Standard category</u>	<u>Percent of closure orders</u>	<u>Total orders issued</u>	<u>Immi- nent danger</u>	<u>Non- compli- ance</u>	<u>Not speci- fied</u>
63. .20-0	Miscella- neous	0.2	9	5	3	1

These orders could not be further identified for specific sections of the standards.

64. .12-17	Electricity	0.2	9	6	2	1
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Power circuits shall be deenergized before work is done on such circuits, unless hotline tools are used. Suitable warning signs shall be posted by individuals who are to do the work. Switches shall be locked out or other measures taken which shall prevent the power circuits from being energized without the knowledge of the individuals working on them. Such locks, signs, or preventative devices shall be removed only by the person who installed them or by authorized personnel.

Application: This standard requires a lockout or some other preventative system, such as disconnecting leads where lockouts are not practicable, unless hotline tools are used. A tagout system only is not acceptable since it is not preventative.

A tag, in addition to lockout or some other preventative system, is required by this standard because of the much greater area and number of persons affected by deenergizing a power circuit than are affected by deenergizing a single piece of equipment.

65. .9-61	Loading, hauling, and dumping	0.2	9	7	1	1
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Stockpile and muckpile faces shall be trimmed to prevent hazards to personnel.

66. .9-0	Loading, hauling, and dumping	0.2	9	9	0	0
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These closure orders could not be further identified for specific section of the standards.

<u>Stand- ard number</u>	<u>Standard category</u>	Percent of <u>closure orders</u>	Total <u>orders issued</u>	Immi- nent <u>danger</u>	Non- compli- <u>ance</u>	Not speci- <u>fied</u>
67.	.6-177 Explosives	0.2	9	6	1	2

Misfires shall be reported to the proper supervisor. The blast area shall be dangered off until misfired holes are disposed of. When explosives other than black powder have been used, misfired holes shall be disposed of as soon as possible by one of the following methods:

- a. Washing the stemming and charge from the borehole with water.
- b. Reattempting to fire the holes if leg wires are exposed.
- c. Inserting new primers after the stemming has been washed out.

68.	.6-40 Explosives	0.2	9	8	1	0
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Explosives and detonators shall be transported in separate vehicles, unless separated by 4 inches of hardwood or the equivalent.

69.	.6-5 Explosives	0.2	9	1	8	0
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Areas surrounding magazines and facilities for the storage of blasting agents shall be kept clear of rubbish, brush, dry grass, or trees (other than live trees 10 or more feet tall), for a distance not less than 25 feet in all directions, and other unnecessary combustible materials for a distance of not less than 50 feet.

70.	.4-4 Fire pre- vention and control	0.2	9	6	3	0
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Flammable liquids shall be stored in accordance with standards of the National Fire Protection Association or some other recognized agency approved by the Mining Enforcement and Safety Administration. Small quantities of flammable liquids drawn from storage shall be kept in appropriately labeled safety cans.

<u>Stand- ard number</u>	<u>Standard category</u>	<u>Percent of closure orders</u>	<u>Total orders issued</u>	<u>Immi- nent danger</u>	<u>Non- compli- ance</u>	<u>Not speci- fied</u>
71. .19-128	Man hoisting	0.2	8	8	0	0

Ropes shall not be used for hoisting when they have:

- a. More than six broken wires in any lay.
- b. Crown wires worn to less than 65 percent of the original diameter.
- c. A marked amount of corrosion or distortion.
- d. A combination of similar factors individually less severe than those above but, in aggregate, might create an unsafe condition.

Application: The inspector will look for obvious defects and excessive wear, ask to see and check records, but will not be expected to perform a full and complete inspection of a wire rope, a hoist, nor a sheave, etc. Where his observations warrant, he will call for assistance from the Technical Support Group.

Item b does not apply to flattened strand ropes.

72. .16-6	Materials storage and handling	0.2	8	2	6	0
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Valves on compressed gas cylinders shall be protected by covers, when being transported or stored, and by a safe location when the cylinders are in use.

Application: "Cover" means screw-type cap that is normally a part of the cylinder.

73. .12-1	Electricity	0.2	8	7	1	0
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Circuits shall be protected against excessive overloads by fuses or circuit breakers of the correct type and capacity.

<u>Stand- ard number</u>	<u>Standard category</u>	<u>Percent of closure orders</u>	<u>Total orders issued</u>	<u>Immi- nent danger</u>	<u>Non- compli- ance</u>	<u>Not speci- fied</u>
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Application: "Excessive overload" interpreted to mean an overload in excess of that permitted by the manufacturer, by the National Electrical Code, or by a competent agency acceptable to the Bureau of Mines.

74.	.11-6	Travel-ways and escape-ways	0.2	8	0	8	0
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Fixed ladders shall project at least 3 feet above landings or substantial handholds shall be provided above the landings.

75.	.9-6	Loading, hauling, and dumping	0.2	8	1	7	0
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When the entire length of a conveyor is visible from the starting switch, the operator shall visually check to make certain that all persons are in the clear before starting the conveyor. When the entire length of the conveyor is not visible from the starting switch, a positive audible or visible warning system shall be installed and operated to warn persons that the conveyor will be started.

76.	.6-103	Explosives	0.2	8	8	0	0
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Areas in which charged holes are awaiting firing shall be guarded, or barricaded and posted, or flagged against unauthorized entry.

77.	.4-52	Fire prevention and control	0.2	8	3	3	2
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Gasoline shall not be stored underground but may be used only to power internal combustion engines in nongassy mines that have multiple horizontal or inclined roadways

<u>Stand-</u> <u>ard</u> <u>number</u>	<u>Standard</u> <u>category</u>	<u>Percent</u> <u>of</u> <u>closure</u> <u>orders</u>	<u>Total</u> <u>orders</u> <u>issued</u>	<u>Immi-</u> <u>nent</u> <u>danger</u>	<u>Non-</u> <u>compli-</u> <u>ance</u>	<u>Not</u> <u>speci-</u> <u>fied</u>
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from the surface large enough to accommodate vehicular traffic. Roadways and other openings shall not be supported or lined with combustible material. All roadways and other openings shall be connected with another opening every 100 feet by a passage large enough to accommodate any vehicle in the mine.

78.	.3-8	Ground control	0.2	8	5	1	2
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The supervisor or a competent person designated by him, shall examine working areas and faces for unsafe conditions at least at the beginning of each shift and after blasting. Any unsafe condition found shall be corrected before any further work is done at the immediate area or face at which the unsafe condition exists.

Application: The intent of this recommendation is that the responsibility for examining working areas and faces for unsafe conditions, planning corrective action, and seeing that the corrective action is accomplished rests with supervision. A competent person designated by a supervisor may include a miner or worker assigned to the working place.

79.	.20-20	Miscellaneous	0.2	7	4	3	0
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Access to unattended mine openings shall be restricted by gates or doors or the openings shall be fenced and posted.

80.	.18-10	Safety programs	0.2	7	0	7	0
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Selected supervisors shall be trained in first aid. First-aid training shall be made available to all interested employees.

Application: Supervisors should be selected for first-aid training on the basis of having supervisors so trained available at each part of the operation on all shifts.

	<u>Stand- ard number</u>	<u>Standard category</u>	<u>Percent of closure orders</u>	<u>Total orders issued</u>	<u>Immi- nent danger</u>	<u>Non compli- ance</u>	<u>Not speci- fied</u>
81.	.11-51	Travel- ways and escape- ways	0.2	7	4	3	0

Escape routes shall be:

- a. Inspected at regular intervals and maintained in safe, travelable condition.
- b. Marked with conspicuous and easily read direction signs that clearly indicate the ways of escape.

Application: "Regular intervals" means at intervals no greater than monthly where conditions are stable and more often where conditions may change.

82.	.6-42	Explosives	0.2	7	3	4	0
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Self-propelled vehicles used to transport explosives or detonators shall be equipped with suitable fire extinguishers.

Application: Extinguisher shall be not less than a 2-pound dry chemical fire extinguisher, each of at least 6-BC rating.

83.	.4-1	Fire pre- vention and con- trol	0.2	7	5	2	0
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No person shall smoke or use an open flame:

- a. Where flammable solvents, liquids, fluids, or other flammable materials are stored, transported, handled, or used.
- b. Where oil or grease is stored, transported, handled, or used if smoking or the use of an open flame may cause a fire.

<u>Stand-</u> <u>ard</u> <u>number</u>	<u>Standard</u> <u>category</u>	Percent of <u>closure</u> <u>orders</u>	Total <u>orders</u> <u>issued</u>	Immi- nent <u>danger</u>	Non compli- <u>ance</u>	Not speci- <u>fied</u>
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c. Within an unsafe distance of any area where smoking or the use of an open flame may cause a fire or an explosion.

Application: This standard does not preclude welding or cutting in accordance with Standards 55, 56, and 57.4-29. "Other flammable materials" includes materials, such as wood, in easily ignitable forms, such as sawdust, shavings, bark, or shreds. This standard does not apply to well-kept, inside office environments.

84.	.19-0	Man hoisting	0.1	6	4	0	2
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These closure orders could not be further identified for specific section of the standards.

85.	.18-12	Safety programs	0.1	6	0	6	0
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Emergency telephone numbers shall be posted at appropriate telephones.

Application: Emergency numbers will include numbers for at least ambulance, hospital, medical units, fire, company personnel, State or county mine inspectors, and the Bureau of Mines, posted at appropriate onsite telephones that have outside connections.

86.	.14-0	Use of equipment	0.1	6	5	1	0
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These closure orders could not be further identified for specific section of the standards.

87.	.12-71	Electricity	0.1	6	6	0	0
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When equipment must be moved or operated near energized high-voltage powerlines (other than trolley lines) and the clearance is less than 10 feet, the lines shall be deenergized or other precautionary measures shall be taken.

<u>Stand-</u> <u>ard</u> <u>number</u>	<u>Standard</u> <u>category</u>	<u>Percent</u> <u>of</u> <u>closure</u> <u>orders</u>	<u>Total</u> <u>orders</u> <u>issued</u>	<u>Immi-</u> <u>nent</u> <u>danger</u>	<u>Non-</u> <u>compli-</u> <u>ance</u>	<u>Not</u> <u>speci-</u> <u>fied</u>
88. .12-23	Electric- ity	0.1	6	0	6	0

Electrical connections and resistor grids that are difficult or impractical to insulate shall be guarded, unless protection is provided by location.

89. .7-2	Drilling	0.1	6	2	3	1
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Equipment defects affecting safety shall be corrected before the equipment is used.

90. .6-45	Explosives	0.1	6	6	0	0
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Vehicles containing explosives or detonators shall not be taken to a repair garage or shop for any purpose.

91. .6-43	Explosives	0.1	6	2	4	0
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Vehicles containing explosives or detonators shall be posted with proper warning signs.

Application: For a guideline of what would be acceptable as "proper warning signs," the latest edition of the Blasters' Handbook should be used for surface transportation of explosives.

For underground transportation of explosives, judgment should be used according to type and size of vehicle in determining acceptable "proper warning signs" and their placement on the vehicle.

92. .4-18	Fire pre- vention and control	0.1	6	3	3	0
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Oxygen cylinders shall not be stored in rooms or areas used or designated for oil or grease storage.



<u>Stand- ard number</u>	<u>Standard category</u>	<u>Percent of closure orders</u>	<u>Total orders issued</u>	<u>Immi- nent danger</u>	<u>Non- compli- ance</u>	<u>Not speci- fied</u>
93. .4-11	Fire pre- vention and con- trol	0.1	6	1	4	1

Abandoned electrical circuits shall be deenergized and isolated so that they cannot become energized inadvertently.

Application: In addition to deenergizing, abandoned circuits must be isolated by removing the deenergized conductors from the power switches.

94. .18-20	Safety programs	0.1	5	4	1	0
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No worker shall be assigned, or allowed, or be required to do work alone in any area where hazardous conditions exist that would endanger his safety unless he can communicate with others, can be heard, or can be seen.

Application: This standard entails (1) a clear determination of the existence of dangerous conditions that would endanger specific workers who work alone taking into account any protection provided to them and (2) whether such workers who work alone and are exposed to danger have contact with others so they may receive assistance in the event that they are injured, entrapped, or otherwise rendered helpless.

This standard does not apply to examinations of areas of the mine or working places by qualified personnel such as shift bosses, foremen, and safety personnel unless unsafe conditions are known to exist prior to such examination and unless such personnel would be endangered by such examination.

95. .18-14	Safety programs	0.1	5	0	5	0
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Arrangements shall be made in advance for obtaining emergency medical assistance and transportation for injured persons.

<u>Stand- ard number</u>	<u>Standard category</u>	<u>Percent of closure orders</u>	<u>Total orders issued</u>	<u>Immi- nent danger</u>	<u>Non- compli- ance</u>	<u>Not speci- fied</u>
96. .17-1	Illumina- tion	0.1	5	4	1	0

Illumination enough to provide safe working conditions shall be provided in and on all surface structures, paths, walkways, stairways, switch panels, loading and dumping sites, and working areas.

97. .13-20	Compressed air and boilers	0.1	5	5	0	0
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At no time shall compressed air be directed toward a person. When compressed air is used, all necessary precautions shall be taken to protect persons from injuries.

98. .11-3	Travelways and es- capeways	0.1	5	0	5	0
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Ladders shall be sturdy and maintained in good condition.

99. .9-32	Loading, hauling, and dumping	0.1	5	5	0	0
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Dippers, buckets, scraper blades, and similar movable parts shall be secured or lowered to the ground when not in use.

100. .6-102	Explosives	0.1	5	4	1	0
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Unused explosives and detonators shall be moved to a safe location as soon as charging operations are completed.

a/Descriptions of the standards were obtained from title 30, Code of Federal Regulations, chapter 1. Applications, where available, were obtained from a Bureau of Mines' publication entitled "Promulgated Health and Safety Standards with Applications for Metal and Nonmetal Mines."

## STATES AND TERRITORIES

## BY NUMBER OF CLOSURE ORDERS ISSUED

State or territory	Number of orders issued	Type of order			Number of mining operations cited	Active mining operations in calendar year 1974	Total injuries reported in calendar year 1974
		Imminent danger	Non-compliance	Not specified			
1. Tex.	403	284	118	1	137	471	448
2. Ala.	395	117	245	33	71	206	255
3. Puerto Rico	311	5	291	15	19	4	0
4. Pa.	278	196	64	18	105	423	451
5. Mo.	251	141	79	31	107	501	720
6. La.	238	175	63	0	54	154	233
7. Ga.	235	123	106	6	92	279	439
8. Mich.	217	150	55	12	32	575	693
9. Nev.	172	65	84	23	55	289	225
10. Ill.	143	100	40	3	49	504	535
11. Fla.	121	64	56	1	43	244	765
12. N.Y. (note a)	110	109	1	0	19	507	366
13. N.J.	101	49	50	2	53	166	144
14. Wash.	98	36	57	5	51	536	64
15. Miss.	96	41	52	3	27	115	84
16. Okla.	89	67	20	2	38	179	265
17. Virgin Islands	81	2	79	0	3	4	13
18. Kans.	79	30	46	3	27	342	107
19. Mont.	75	28	13	34	26	140	192
20. Ark.	69	37	27	5	37	183	210
21. Colo. (note b)	64	45	0	19	36	426	661
22. Mass.	62	12	49	1	53	318	37
23. Tenn.	62	37	24	1	33	270	346
24. Wis.	55	32	11	12	29	748	134
25. Ky.	53	23	26	4	20	178	200
26. Iowa	52	26	23	3	25	633	146
27. Md.	45	35	10	0	17	94	119
28. Minn.	45	22	22	1	21	591	746
29. Va. (note c)	44	25	3	16	16	306	358
30. Conn.	42	21	19	2	27	142	80
31. Ind.	42	13	29	0	18	348	144
32. Ore.	39	24	14	1	28	347	76
33. Vt.	37	23	14	0	19	113	105
34. Wyo.	37	23	9	5	11	208	328
35. Maine	36	26	9	1	13	119	37
36. Neb.	35	11	22	2	13	300	51
37. Ohio	31	14	16	1	17	624	422
38. Idaho	30	18	6	6	19	237	277
39. S. Dak.	25	19	5	1	7	325	229
40. Utah (note d)	25	17	6	2	21	276	109
41. Alaska	21	15	5	1	16	225	13
42. N.C.	20	8	10	2	10	384	252
43. N.H.	18	8	9	1	11	63	44
44. Ariz. (note e)	17	11	2	4	11	418	2,268
45. S.C.	15	6	9	0	8	129	93
46. N. Dak.	10	3	7	0	6	89	13
47. R.I.	10	0	10	0	9	40	12
48. W. Va.	9	8	1	0	6	65	58
49. Calif. (note f)	7	3	4	0	6	629	664
50. Del.	7	4	3	0	5	16	4
51. Hawaii	3	0	2	1	2	34	58
52. N. Mex. (note g)	2	2	0	0	1	330	865
<b>Total</b>	<b>4,562</b>	<b>2,353</b>	<b>1,925</b>	<b>284</b>	<b>1,609</b>	<b>14,847</b>	<b>15,158</b>

a/State Plan Agreement was approved on Aug. 17, 1971.

b/State Plan Agreement was approved on Sept. 25, 1970.

c/State Plan Agreement was approved on Feb. 6, 1974.

d/State Plan Agreement was approved on Sept. 6, 1973.

e/State Plan Agreement was approved on July 28, 1970.

f/State Plan Agreement was approved on July 15, 1971.

g/State Plan Agreement was approved on Feb. 3, 1972.

Calif. rescinded its agreement on Feb. 15, 1975.

83 MOST FREQUENTLY CITED MINING OPERATIONS

Mine number	Name of mining operation	Number of closure orders issued	Type of order			Mineral commodity	Mine type (note a)	State or territory	Number of employees
			Imminent danger	Non-compliance	Not specified				
1.	2000371 White Pine Mine	58	46	9	3	Copper	UG	Mich.	290
2.	2001239 Permanently abandoned (note b)	51	43	0	8	-	-	-	-
3.	0100009 Dolcito Quarry and Mill	43	11	32	0	Limestone	OP	Ala.	69
4.	5400139 Cantera Bentacourt	40	0	40	0	Limestone	OP	Puerto Rico	9
5.	1600358 Cote Blanche Mine	40	39	1	0	Salt	UG	La.	88
6.	0100604 North Alabama Sand	36	4	32	0	Sand and gravel	OS	Ala.	6
7.	1600238 International Salt	33	28	5	0	Salt	UG	La.	60
8.	5400143 Dos Bocas	31	0	31	0	Marble	OP	Puerto Rico	4
9.	2200035 Oil-Dri Production	30	6	24	0	Clay and shale	OP	Miss.	90
10.	5400054 Arenero Tanama	30	0	30	0	Sand and gravel	OS	Puerto Rico	11
11.	3000663 Cayuga Mine and Mill	28	28	0	0	Salt	UG	N.Y.	15
12.	5500006 Robes Hill Mine	28	0	28	0	Traprock	OP	Virgin Islands	10
13.	5400142 Terra Products Quarry	27	0	27	0	Limestone	OP	Puerto Rico	30
14.	5500001 Camasco Quarry	27	2	25	0	Traprock	OP	Virgin Islands	14
15.	5500002 Springfield Crusher	26	0	26	0	Traprock	OP	Virgin Islands	15
16.	0100015 Lone Star Industries	23	5	18	0	Cement	OP	Ala.	20
17.	5400140 Cantera Crespo	23	0	23	0	Limestone	OP	Puerto Rico	5
18.	0101101 White Hall Pit	22	0	22	0	Sand and gravel	OS	Ala.	4
19.	5400135 Cantera San Antonio	22	0	22	0	Limestone	OP	Puerto Rico	16
20.	5400141 Cantera Jayuya	22	0	22	0	Limestone	OP	Puerto Rico	6
21.	5400090 Cantera De Puerto Rico	21	1	20	0	Limestone	OP	Puerto Rico	12
22.	2600982 Hall Pit	20	0	20	0	Sand and gravel	OS	Nev.	3
23.	0100025 Montevallo Limestone	19	0	17	2	Limestone	OP	Ala.	20
24.	1101602 Gaskins Mine	19	17	1	1	Fluorspar	UG	Ill.	35
25.	3400282 St. Clair Lime	19	14	4	1	Lime	UG	Okla.	13
26.	1700188 Kerramerican, Inc.	18	17	1	0	Copper	UG	Maine	109
27.	4100059 Servtex Materials Company	18	8	10	0	Limestone	OP	Tex.	121
28.	4800155 Alchem Trona Mine	18	7	9	2	Sodium compounds	UG	Wyo.	1,000
29.	3602620 Bethlehem Mine Corporation	17	10	7	0	Iron	UG	Pa.	793
30.	4400083 Natural Tunnel Stone	17	1	0	16	Limestone	OP	Va.	7
31.	0100541 Alpine Sand and Gravel	17	3	14	0	Sand and gravel	OS	Ala.	6
32.	2000552 International Salt Company	17	9	8	0	Salt	UG	Mich.	154
33.	2300741 Nemo Quarry and Mill	17	7	10	0	Limestone	OP	Mo.	7
34.	5400096 Cantera Ramos	16	0	16	0	Limestone	OP	Puerto Rico	21
35.	5400119 Cantera Coto Norte	16	0	16	0	Traprock	OP	Puerto Rico	19
36.	4100120 Industrial Quarry	16	5	11	0	Limestone	OP	Tex.	36
37.	0101066 Connor Pit	15	0	15	0	Sand and gravel	OS	Ala.	10
38.	5400073 Arenero De Rio Abajo	15	0	0	15	Sand and gravel	OS	Puerto Rico	8
39.	1600246 Cargill Inc. Belle Island	15	15	0	0	Salt	UG	La.	97
40.	3900055 Homestake Mining Company	15	14	0	1	Gold-silver lode and placer	UG	S. Dak.	1,650

Mine number	Name of mining operation	Number of closure orders issued	Type of order			Mineral commodity	Mine type (note a)	State or territory	Number of employees	
			Imminent danger	Non-compliance	Not specified					
41.	0100617	Tri-State Sand Company	14	0	14	0	Sand and gravel	OS	Ala.	12
42.	5400055	Gravero Gallardo	14	0	14	0	Sand and gravel	OS	Puerto Rico	6
43.	2001019	Georgia Pacific Corporation	14	8	6	0	Gypsum	UC	Mich.	12
44.	4100941	United Salt Corporation	14	14	0	0	Salt	UG	Tex.	16
45.	2300103	Blue Valley No. 2 Mine	14	9	5	0	Limestone	UG	Mo.	1
46.	2600706	Wadsworth Sand and Gravel	14	0	0	14	Sand and gravel	OS	Nev.	3
47.	3604294	Lesoine Pit and Plant	13	0	12	1	Sand and gravel	OP	Pa.	4
48.	0101237	Pierce Pit and Plant	13	0	13	0	Sand and gravel	OS	Ala.	4
49.	0800026	Diamond Hill Quarry	13	5	8	0	Limestone	OP	Fla.	125
50.	4100081	Bridgeport Quarry	13	1	12	0	Limestone	OP	Tex.	40
51.	2000667	Leix Pit and Wash	13	1	12	0	Sand and gravel	OS	Mich.	2
52.	1400050	Smerchek Quarry	13	0	13	0	Limestone	OP	Kans.	7
53.	2301159	Third Creek Pit and Plant	13	0	13	0	Sand and gravel	OS	Mo.	3
54.	2400681	Leonard Mine	13	8	0	5	Copper	UG	Mont.	90
55.	5400036	Cantera Dorado	12	0	12	0	Traprock	OP	Puerto Rico	17
56.	4100076	Chico Quarry No. 57	12	12	0	0	Limestone	OP	Tex.	75
57.	2300182	Rock Acres Mine and Mill	12	0	12	0	Limestone	UG	Mo.	18
58.	2600525	Hawthorne Silica Company	12	2	10	0	Sandstone	OP	Nev.	12
59.	3600017	Bethlehem Mines Corporation	11	10	1	0	Lime	OP	Pa.	284
60.	0100853	Plant No. 3, Trinity Stone Company	11	2	0	9	Limetone	OP	Ala.	14
61.	0900038	Hitchcock Corporation	11	5	6	0	Granite	OP	Ga.	48
62.	0900370	Turner Concrete, Inc.	11	0	11	0	Sand and gravel	OS	Ga.	4
63.	0900695	Gainsville Sand and Gravel	11	0	11	0	Sand and gravel	OS	Ga.	2
64.	5400107	Arriba Quarry	11	0	11	0	Limestone	OP	Puerto Rico	8
65.	2000378	Grand Rapids Mine	11	11	0	0	Gypsum	UG	Mich.	11
66.	1200082	Monon Quarry and Mill	11	3	8	0	Limestone	OP	Ind.	18
67.	1400068	Deitz Hill Development	11	0	11	0	Limestone	OP	Kans.	8
68.	2601058	Navy Beach Pit	11	0	11	0	Sand and gravel	OS	Nev.	3
69.	1800009	Harry T. Campbell and Son	10	10	0	0	Limestone	OP	Md.	84
70.	3600052	G & WH Carson, Inc.	10	10	0	0	Lime	OP	Pa.	200
71.	3603122	Keystone Plant and Quarry	10	7	3	0	Sandstone	OP	Pa.	185
72.	0100031	Southern Stone Company	10	3	7	0	Limestone	OP	Ala.	23
73.	0800051	Pennsuco Cement	10	7	2	1	Limestone	OP	Fla.	200
74.	0900074	Weston and Broker Company	10	3	7	0	Granite	OP	Ga.	65
75.	0900759	Hall County Quarry	10	0	10	0	Granite	OP	Ga.	9
76.	4701380	Park View Sand and Gravel	10	4	0	6	Sand and gravel	OS	Wis.	5
77.	1100020	Calhoun Quarry Pit	10	0	10	0	Limestone	OP	Ill.	4
78.	0300602	Mississippi River	10	0	10	0	Sand and gravel	OS	Ark.	2
79.	1600536	Lansing Dredge and Plant	10	1	9	0	Sand and gravel	OS	La.	(c)
80.	4100253	Barrett Pit and Plant	10	2	8	0	Clay and shale	OP	Tex.	12
81.	2300454	Pea Ridge Mine and Mill	10	0	1	1	Iron	UG	Mo.	984
82.	2400773	Phosphate Mill	10	1	5	4	Phosphate rock	ML	Mont.	30
83.	4500844	Nordlund Quarry	10	0	10	0	Traprock	OS	Wash.	4
Total			<u>1,481</u>	<u>487</u>	<u>904</u>	<u>90</u>				

a/Underground (UG), open pit (OP), other surface (OS), and mill (ML).

b/Mining operation has been permanently abandoned.

c/Number not known.

MOST FREQUENTLY CITED  
MINING OPERATIONS BY MINERAL COMMODITIES

<u>Mineral commodities</u>	<u>Number of mining operations</u>	<u>Number of closure orders issued</u>	<u>Imminent danger</u>	<u>Type of order</u>	
				<u>Non-compliance</u>	<u>Not specified</u>
Stone quarries and mills:					
Cement:					
Underground	1	7	3	4	0
Open pit	1	23	5	18	0
Mill	1	6	3	3	0
	<u>3</u>	<u>36</u>	<u>11</u>	<u>25</u>	<u>0</u>
Granite:					
Open pit	9	66	19	47	0
Limestone:					
Open pit	51	612	155	418	39
Other surface	2	13	8	5	0
Underground	7	58	26	32	0
Mill	1	6	1	5	0
	<u>61</u>	<u>689</u>	<u>190</u>	<u>460</u>	<u>39</u>
Lime:					
Open pit	3	28	25	3	0
Underground	3	33	28	4	1
	<u>6</u>	<u>61</u>	<u>53</u>	<u>7</u>	<u>1</u>
Marble:					
Open pit	3	44	5	39	0
Underground	4	28	26	2	0
	<u>7</u>	<u>72</u>	<u>31</u>	<u>41</u>	<u>0</u>
Sandstone:					
Open pit	5	37	14	22	1
Underground	1	6	0	6	0
	<u>6</u>	<u>43</u>	<u>14</u>	<u>28</u>	<u>1</u>
Slate:					
Open pit	1	5	0	5	0
Underground	1	5	5	0	0
	<u>2</u>	<u>10</u>	<u>5</u>	<u>5</u>	<u>0</u>
Traprock:					
Open pit	8	125	12	113	0
Other surface	1	10	0	10	0
	<u>9</u>	<u>135</u>	<u>12</u>	<u>123</u>	<u>0</u>
Miscellaneous stone:					
Open pit	1	7	2	5	0
<b>Total</b>	<b>104</b>	<b>1,119</b>	<b>337</b>	<b>741</b>	<b>41</b>

## APPENDIX V

## APPENDIX V

Mineral commodities	Number of mining operations	Number of closure orders issued	Type of order		
			Imminent danger	Non- compliance	Not specified
<b>Metal mines and mills:</b>					
Bauxite (including alumina mills):					
Mill	<u>1</u>	<u>5</u>	<u>5</u>	<u>0</u>	<u>0</u>
Copper:					
Underground	<u>6</u>	<u>104</u>	<u>83</u>	<u>10</u>	<u>11</u>
Mill	<u>1</u>	<u>7</u>	<u>7</u>	<u>0</u>	<u>0</u>
	<u>7</u>	<u>111</u>	<u>90</u>	<u>10</u>	<u>11</u>
Gold and silver lode and placer:					
Underground	<u>3</u>	<u>29</u>	<u>24</u>	<u>1</u>	<u>4</u>
Iron:					
Underground	<u>2</u>	<u>27</u>	<u>18</u>	<u>8</u>	<u>1</u>
Open pit	<u>1</u>	<u>6</u>	<u>2</u>	<u>4</u>	<u>0</u>
	<u>3</u>	<u>33</u>	<u>20</u>	<u>12</u>	<u>1</u>
Lead and zinc:					
Underground	<u>7</u>	<u>43</u>	<u>35</u>	<u>2</u>	<u>6</u>
Total	<u>21</u>	<u>221</u>	<u>174</u>	<u>25</u>	<u>22</u>
<b>Nonmetal mines and mills:</b>					
Clay and shale:					
Open pit	<u>6</u>	<u>62</u>	<u>23</u>	<u>39</u>	<u>0</u>
Fluorspar:					
Underground	<u>5</u>	<u>48</u>	<u>44</u>	<u>3</u>	<u>1</u>
Gypsum:					
Underground	<u>3</u>	<u>31</u>	<u>19</u>	<u>12</u>	<u>0</u>
Phosphate rock:					
Open pit	<u>1</u>	<u>7</u>	<u>0</u>	<u>7</u>	<u>0</u>
Underground	<u>1</u>	<u>8</u>	<u>3</u>	<u>0</u>	<u>5</u>
Mill	<u>2</u>	<u>15</u>	<u>4</u>	<u>7</u>	<u>4</u>
	<u>4</u>	<u>30</u>	<u>7</u>	<u>14</u>	<u>9</u>
Salt:					
Underground	<u>8</u>	<u>162</u>	<u>145</u>	<u>17</u>	<u>0</u>
Mill	<u>1</u>	<u>7</u>	<u>5</u>	<u>2</u>	<u>0</u>
	<u>9</u>	<u>169</u>	<u>150</u>	<u>19</u>	<u>0</u>
Sodium compounds:					
Underground	<u>1</u>	<u>18</u>	<u>7</u>	<u>9</u>	<u>2</u>
Talc, soapstone, pyrophyllite:					
Underground	<u>1</u>	<u>7</u>	<u>5</u>	<u>2</u>	<u>0</u>
Other nonmetals:					
Mill	<u>1</u>	<u>5</u>	<u>0</u>	<u>5</u>	<u>0</u>
Total	<u>30</u>	<u>370</u>	<u>255</u>	<u>103</u>	<u>12</u>

## APPENDIX V

## APPENDIX V

<u>Mineral commodities</u>	<u>Number of mining operations</u>	<u>Number of closure orders issued</u>	<u>Type of order</u>		
			<u>Imminent danger</u>	<u>Non- compliance</u>	<u>Not specified</u>
Miscellaneous nonfuel mines and mills:					
Sand and gravel:					
Open pit	1	13	0	12	1
Other surface	57	538	70	425	43
Mill	<u>1</u>	<u>6</u>	<u>1</u>	<u>5</u>	<u>0</u>
	<u>59</u>	<u>557</u>	<u>71</u>	<u>442</u>	<u>44</u>
Total	<u>59</u>	<u>557</u>	<u>71</u>	<u>442</u>	<u>44</u>
Abandoned mining operations	<u>8</u>	<u>96</u>	<u>60</u>	<u>16</u>	<u>20</u>
Total	<u>222</u>	<u>2,363</u>	<u>897</u>	<u>1,327</u>	<u>139</u>



MOST FREQUENTLY CITED MINING OPERATIONS  
BY MINERAL COMMODITIES AND EMPLOYEE SIZE GROUPS

Mineral commodities	Number of mining operations cited	Employee size groups					
		1 to 9	10 to 19	20 to 49	50 to 99	100 or more	Not known
<b>Stone quarries and mills:</b>							
Cement	3	0	1	2	0	0	0
Granite	9	2	3	3	1	0	0
Limestone	61	21	13	16	5	6	0
Lime	6	0	3	0	0	3	0
Marble	7	3	1	1	2	0	0
Sandstone	6	2	3	0	0	1	0
Slate	2	1	1	0	0	0	0
Traprock	9	1	5	2	0	1	0
Miscellaneous stone	1	0	0	1	0	0	—
	<u>104</u>	<u>30</u>	<u>30</u>	<u>25</u>	<u>8</u>	<u>11</u>	<u>0</u>
<b>Metal mines and mills:</b>							
Bauxite (including alumina mills)	1	0	0	0	0	1	0
Copper	7	2	0	0	2	3	0
Gold and silver	3	1	0	0	0	2	0
Iron	3	0	1	0	0	2	0
Lead and zinc	7	1	0	0	1	5	0
	<u>21</u>	<u>4</u>	<u>1</u>	<u>0</u>	<u>3</u>	<u>13</u>	<u>0</u>
<b>Nonmetal mines and mills:</b>							
Clay and shale	6	0	2	1	2	1	0
Fluorspar	5	2	0	3	0	0	0
Gypsum	3	1	2	0	0	0	0
Phosphate rock	4	0	0	1	1	2	0
Salt	9	0	3	0	4	2	0
Sodium compounds	1	0	0	0	0	1	0
Talc, soapstone, pyrophyllite	1	0	0	0	1	0	0
Other nonmetals	1	0	1	0	0	0	0
	<u>30</u>	<u>3</u>	<u>8</u>	<u>5</u>	<u>8</u>	<u>6</u>	<u>0</u>
<b>Miscellaneous nonfuel mines and mills:</b>							
Sand and gravel	59	41	9	6	2	0	1
<b>Abandoned mines</b>	8	0	0	0	0	0	8
<b>Total</b>	<u>222</u>	<u>78</u>	<u>48</u>	<u>36</u>	<u>21</u>	<u>30</u>	<u>9</u>

CLOSURE ORDERS  
RESULTING FROM ACCIDENT INVESTIGATIONS

<u>Mineral commodities</u>	<u>Number of closure orders</u>	<u>Instances where standard violations were cited during previous regular inspection</u>	<u>Number of mining operations</u>
<b>Stone quarries and mills:</b>			
Cement	1	1	1
Granite	4	2	3
Limestone	6	0	5
Lime	2	1	2
Sandstone	<u>1</u>	<u>0</u>	<u>1</u>
	<u>14</u>	<u>4</u>	<u>12</u>
<b>Metal mines and mills:</b>			
Bauxite	1	0	1
Copper	6	1	4
Gold and silver	10	0	5
Iron	4	0	3
Lead and zinc	19	2	13
Molybdenum	4	0	2
Uranium	<u>4</u>	<u>1</u>	<u>4</u>
	<u>48</u>	<u>4</u>	<u>32</u>
<b>Nonmetal mines and mills:</b>			
Barite	1	0	1
Clay and shale	5	0	5
Fluorspar	6	0	4
Gypsum	1	1	1
Phosphate rock	2	0	1
Salt	6	1	6
Sodium compounds	2	1	2
Talc, soapstone, pyrophyllite	<u>1</u>	<u>0</u>	<u>1</u>
	<u>24</u>	<u>3</u>	<u>21</u>
<b>Miscellaneous nonfuel mines and mills:</b>			
Sand and gravel	<u>5</u>	<u>0</u>	<u>5</u>
<b>Total</b>	<u>91</u>	<u>11</u>	<u>70</u>