

NOTICE
ORDERS 360-G, 360-H, 360-I, 385, 386,
387, 388, AND 389, REPEALED
MARCH 7, 1933 AND SUPERSEDED
BY GENERAL ORDERS ON EXPLO-
SIVES.

INDUSTRIAL COMMISSION OF WISCONSIN

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**GENERAL ORDERS ON QUARRIES
AND PITS**

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I. INTRODUCTION

Section 101.06 makes it the duty of employers to furnish employment which shall be safe for their employees, and a place of employment which shall be safe both for employees and frequenters. This section further makes it the duty of employers "to adopt and use methods and processes reasonably adequate to render such place of employment safe," and to "do every other thing reasonably necessary to protect the life, health, safety and welfare of such employees and frequenters." The sections of the statute immediately following make it the duty of the Industrial Commission to declare by general orders what shall be regarded as a reasonably safe place of employment and reasonably safe methods and processes of production.

In discharge of this duty, the Industrial Commission in December, 1920, organized an advisory committee to assist it in drafting general orders relating to safety in quarries. This advisory committee was constituted as follows, the organizations represented being also indicated:

F. C. Wolf.....	Waukesha Lime and Stone Co.....	Waukesha
C. S. Richter.....	Montello Granite Company.....	Montello
R. W. Scherer.....	Western Lime & Cement Co.....	Milwaukee
William Wiske.....	Wisconsin Granite Company.....	Red Granite
William Stoeckman.....	General Refractories Company.....	Ableman
John Stewart.....	Wisconsin State Federation of Labor.....	Red Granite
A. H. Findeisen.....	Industrial Commission.....	Madison

The orders as recommended by the advisory committee were adopted by the Industrial Commission on November 30, 1921. They were published in the official state paper on December 8, 1921, and pursuant to law, became effective January 7, 1922.

Experience in enforcement, and investigation of many serious accidents revealed the fact that some of the orders were not specific enough to be thoroughly understood by quarrymen and that some hazards were not covered at all.

It was therefore considered advisable to revise the existing orders.

The following advisory committee was organized:

E. E. Long, <i>Chairman</i> ,	Western Lime & Cement Co.,	Fond du Lac
Wm. Wiske,	Wisconsin Granite Co.,	Red Granite
Wm. Stoeckman,	General Refractories Co.,	Ableman
Frederich Kannenberg,	Wisconsin Federation of Labor,	Wausau
C. M. Beierle,	Wisconsin Federation of Labor,	Milwaukee
F. C. Wolf,	Waukesha Lime & Stone Co.,	Waukesha
A. H. Findeisen,	Secretary,	Industrial Commission

A meeting of this advisory committee was held in Fond du Lac, July 1, 1929, in which recommended changes were discussed and agreed upon. Public hearings were held in the following places:

Milwaukee, Sept. 10, 1929 Green Bay, Sept. 12, 1929
Fond du Lac, Sept. 11, 1929 Wausau, Sept. 13, 1929

Most of the committee members attended at least one of the meetings. Few criticisms were presented. Recommended changes were considered later and unanimously agreed upon by the committee members.

The amendments to the existing orders and the new orders were approved by the Industrial Commission on November 18, 1929, published in the official state paper on Dec. 5, 1929 and became effective Jan. 4, 1930.

These orders have the force and effect of law. Any interested party may petition the commission for a hearing on the reasonableness of any of its orders, and if the petition be denied, he may appeal to the Circuit Court for Dane County. The orders of the commission, however, are prima facie reasonable and lawful, and are in force until they are found otherwise by the courts, or until they are repealed by the commission. Violation of any order is punishable by a forfeiture of \$10 to \$100 for each day and each instance of violation. Moreover, if an accident results because of the violation of any lawful general order of the Industrial Commission, the employer, under Paragraph (h) of Section 102.09 (5), must pay the injured employee increased compensation, amounting to 15 per cent of the regular compensation; and this increase can be paid by the insurance company only in the event that the employer is bankrupt. It should also be noted that liability for forfeitures and for increased compensation does not depend upon whether the employer's attention has been specifically directed to the violations. It is the employer's duty to comply with all general orders of the Industrial Commission, and not merely with such orders as are especially brought to his attention.

II. GENERAL ORDERS ON QUARRIES AND PITS

Order 358—Construction of Orders. Failure on part of superintendents, foremen, bosses and other persons having control of any place of employment, or of any employee and of any operations, to carry out any duty prescribed in these orders, is violation of such order by the employer.*

Order 360—Definitions.

(a) *Application.* These orders shall apply to all quarries and pits in the state of Wisconsin.

(b) *Singular and Plural Numbers.* For the purpose of these orders the singular number when used in reference to persons, acts, objects and things of whatsoever kind and description shall, whenever the context will permit, be taken and held to import and include the plural number, and the plural number shall similarly be taken and held to import and include the singular.

Note: Section 101.06 of the statutes makes it the duty of all employers to provide a safe place of employment. The Industrial Commission cannot by order relieve employers of this obligation. No matter how the orders of the Industrial Commission may read, the employer is responsible if he does not provide safe employment. If any employee is injured through a violation of any order of the commission, he can recover a 15% increase in compensation from his employer, under the provisions of section 102.09 (5) (h). This order, consequently does not impose any obligation upon the employer which is not placed upon him by the statutes of the state, but makes it clear that this entire set of orders is not intended and cannot nullify the express provisions of section 101.06.

The attention of superintendents and foremen and of other persons having control of any operation or any operation, however, is directed to the fact that the term "employer" as used in section 101.01 is defined to include "every person, firm, corporation, agent, manager, representative, or other person having control or custody of any employment, place of employment, or of any employee." The duty to provide a safe place of employment rests not only upon the employer, but also upon the superintendent and foreman. Failure on the part of a superintendent or foreman to comply with any order contained in this code is a violation of law and renders him personally liable to a forfeiture of ten to one hundred dollars for each day and each instance of violation. This forfeiture can be collected at any time within two years after it is incurred through a civil suit brought by the attorney general. In such a suit the only possible defense is proof of compliance with the commission's order.

Superintendents, foremen and others who are specifically charged with any duty by any order contained in these general orders on quarries will be held responsible by the Industrial Commission for the discharge of such duties. Employers, however, should also realize that they may become liable for increased compensation, if they do not see to it that the superintendents and foremen observe these orders.

(c) *Definition of Quarry or Pit.* The term "quarry" or "pit" when used in these orders shall be held to mean a place from which stone, rock, sand, gravel, or any other material is removed from open face workings, but shall not include the removal of material in construction work, except when explosives are used to remove stone.

(d) *Superintendent.* The term "superintendent" when used in these orders shall mean the person having general supervision of the quarry.

(e) *Foreman.* The term "foreman" when used in these orders shall mean a person who at any one time is charged with the immediate direction of the quarry work.

(f) *Excavations or Workings.* The words "excavations" and "workings" when used in these orders shall signify all working places of a quarry, whether abandoned or in use.

(g) *Explosives.* The term "explosive" or "explosives" as used in these orders shall mean all explosive compounds commonly used in blasting practice, including the dynamites, Gelatin Dynamites, Ammonium-nitrate Dynamite, blasting powders, black powders, fuse, and all detonators.

(h) *Magazine.* The term "magazine" as used in these orders, shall be held to mean and include any building or other structure or place in which explosives are stored or kept, whether above or below ground.

(i) *Primer.* The term "primer" when used in these orders shall be held to mean a capped fuse or electric exploder inserted in a stick of powder.

(j) *Person.* The term "person" when used in these orders shall be held to mean and include a firm or body corporate as well as natural persons.

(k) *Approved.* The term "approved" shall be held to mean approved by the Industrial Commission.

Order 361—General Safety Precautions. (a) The operator and superintendent of every quarry shall use every reasonable precaution to insure the safety of the workmen

in the quarry in all cases, whether provided for in these orders or not.

(b) All defects in or damage or injury to machinery or timbering or to apparatus and equipment generally in and about a quarry, all unsafe or dangerous conditions in any part of the quarry, and all accidents occurring in the course of quarrying operations, even though not resulting in personal injury, shall be promptly reported to the quarry foreman or superintendent by the person observing the same.

(c) Each workman employed in the quarry, when first engaged, shall have his attention directed to the general and special rules provided for in these orders, and if not able to read the English language, to have them explained to him.

(d) No person shall without authority of his foreman or superintendent handle electric wires or conductors, or electrical apparatus of any kind.

Order 362—Bulletin Boards. Safety bulletin boards shall be provided by operators at all quarries. Miscellaneous rules for quarrymen, safety bulletins, pictures, slogans, or circulars shall be posted on such bulletin boards.

Note: Neat and attractive bulletin boards properly placed are essential in maintaining the interest of workers in accident prevention work. Frequent changes of bulletins have been found necessary and bulletins should not be left on the board for a longer period than ten days. If a new bulletin is not immediately available it is better to leave the board vacant until one is available. The next bulletin posted is certain to attract attention. In addition to bulletins provided by insurance companies, the use of bulletins provided by the National Safety Council is recommended as well as homemade bulletins, photographs, newspaper accounts of accidents, cartoons, exhibits of unsafe tools, broken goggles, short letters from the manager, etc.

Order 363—Care of the Injured. (a) It shall be the duty of employers to keep at such place or places as shall be convenient and accessible to employees a stretcher and a woolen blanket for use in carrying any person who may be injured. An approved supply of First Aid material shall be kept and maintained at all times in a dust and moisture proof box.

(b) It shall be the duty of the employer, on all quarry and pit operations, to designate certain employees to be trained in the application of first aid, and at least one employee who has had first aid training shall be present throughout each shift. It shall be the duty of the em-

ployer to procure the services of a competent person to instruct such employees from time to time but not less than once each year in the proper handling and treatment of injured persons before the arrival of a physician.

Note: The Industrial Commission has from time to time arranged with the United States Bureau of Mines for their staff of instructors to give training in First Aid to men employed in mines and quarries. Whenever a school is arranged for at places located conveniently near the work in progress, it is expected that each employer shall take advantage of the opportunity by enrolling men to receive this training.

Order 364—Tunnels in Quarries. All tunnel work in connection with quarry operations shall be governed by the provisions of the General Orders on Safety in Mines issued by the Industrial Commission of Wisconsin.

Order 365—Superintendents. (a) The operator of every quarry shall appoint a man who shall be personally in charge of the quarry and the performance of the work done therein, who shall be designated as the "superintendent", provided, however, that nothing herein contained shall prevent the owner or operator of any quarry from personally filling the office of superintendent.

(b) The superintendent of every quarry or pit shall inspect or cause some competent person or persons appointed by him to inspect all appliances, boilers, engines, magazines, explosives, signalling devices, tracks, ladders, dry closets, and all parts and appliances in actual use, and any such person or persons appointed by the superintendent shall at once report any defects therein to the superintendent. It shall be the duty of the superintendent, upon ascertaining such defects to take immediate steps to remedy the same so as to make the same comply with the provisions of these orders, and he shall forthwith notify the operator of said quarry or pit of the existence of such defects. It shall be the duty of the superintendent to appoint a competent man to have full charge, under the direction of the superintendent of every magazine containing explosives situated on the premises, and to make such other appointments and perform such other duties as are provided by these orders to be performed by such superintendent.

Order 366—Inspection at the Face of the Quarry. (a) The superintendent of the quarry or a competent person

detailed for this purpose shall make frequent inspections of the face of the quarry and of the overburden where men are employed and shall dislodge any slabs of rock or boulders in said face that may be dangerous to employees.

(b) During thawing and freezing periods workmen shall not be permitted to expose themselves next to vertical or steeply inclined ledges. Where ledges are inclined 30 degrees or more from the vertical, work may be permitted provided watchmen are employed at each working place to warn men when loose rocks are about to fall.

Note: Exceptions. Where material is handled by hand labor next to vertical or steeply inclined ledges work may be permitted provided material is blasted so as to be thrown sufficiently clear from the base of the ledge to eliminate exposure to falling rocks.

When rock walls are smooth with little or no fracturing and not subject to open joints or presence of seams of clay or inferior rock, and past experience has proven that alternate freezing and thawing is not productive of rock falls, exceptions may be made to paragraph (b) provided Order 366 (a) has been strictly complied with.

(c) *Trimming Bars and Ladders.* Trimming bars and extension ladders shall be provided and maintained in good condition for the trimming of loose rocks from the quarry ledge.

(d) *Trimming Loose Scale.* Persons engaged in trimming down loose scale and loose rock from high and steeply inclined ledges shall be provided with safety ropes. One end of the rope must be attached to the body continually and the opposite end firmly secured at the top of the bank.

(e) *Bars for Rock Piles.* Each working place in the quarry shall be provided with a bar 8-12 feet in length to be used when pulling down rock piles. One end of the bar shall be provided with a handhold and the opposite end with a hook or 90 degree bend.

Order 368—Sand and Gravel Excavations. (a) Sand and gravel excavations shall be kept sloped at all times. The slope shall not exceed an angle of 60 degrees from the horizontal. If at any time the gravel bank or any section of the bank approaches an angle exceeding 60 degrees from the horizontal, means shall be taken immediately to reduce the slope by caving. Overhangs at the top

of the bank shall be barred or shot down as fast as developed.

Exception: When excavating with mechanical shovels or cranes, the face may be worked to a height not to exceed twice the reach of the shovel or crane without caving to reduce the slope; provided however, that employees shall not be permitted to expose themselves in close proximity to the bank until the face has been sloped as required above.

(b) During caving operations no employee shall be permitted to expose himself directly in front of the section to be caved.

Order 369—Overburden. All places in quarry excavations where men are or may be regularly employed, the top soil or overburden shall not be made continuous with the quarry walls and shall be protected either by

(1) The overburden shall be stripped to bedrock to provide a bench the width of which shall equal the depth of the overburden.

(2) The overburden shall be kept sloped 45 degrees with the addition of a fence, wall, or cribbing to catch rolling stones or slides of material.

(3) Employees shall not be permitted to work where falls of overburden may cause injury.

Order 370—Hoisting Apparatus and Derricks. (a) Wire rope slings, grabhooks or chains shall be used to attach the blocks of stone to the hoisting apparatus.

(b) All ropes, chains, cables, slings, sheaves, gears and other parts of derricks and hoisting apparatus in use shall be carefully examined daily. Any parts that are found to be defective shall be renewed immediately.

(c) The wire rope guys supporting the mast of a derrick and their fastenings shall be inspected semi-monthly while in use and shall be kept in good condition.

(d) An approved signal system shall be maintained when the hoists or derricks are so located that the operator cannot readily see or hear the signals given by men near the end of the hoists or derricks.

Order 371—Cables, Standards. The maximum safe working load for all hoisting cables used in quarries must be not more than one-fifth of the breaking load as given in the schedules of the cable manufacturers. Cables are considered unsafe and must be condemned when through

broken wires, wear, rust, undue strain, or other conditions indicating deterioration, the strength of the cable has deteriorated 20 per cent.

Order 372—Cable Sheaves. Exposed cables, where they pass through sheaves shall be guarded.

Order 373—Hoisting Men. No person shall be hoisted out of or lowered into a quarry. Employees shall not be permitted to ride on conveyor or elevator belts.

Order 374—Hoisting Loads. When blocks of stone or loaded grout pans are being hoisted out of the quarry, the foreman shall require that all employees in the danger zone retire to a place of safety until the load has reached the surface.

Order 375—Hoisted Material. Hoisted material, or any loose material about the quarry shall be deposited not less than ten feet from the edge of the excavation and secured in such a manner that there is no possibility of the material falling back into the pit where the men are employed.

Order 377—Quarry Cars and Haulage. All haulage equipment shall be frequently inspected and all defects properly repaired.

“Rocker” or “Cradle” dump boulder cars shall be equipped with an approved locking device.

Order 378—Elevated Spur Tracks. Elevated spur tracks shall be kept in good condition and a bumper placed on or other means provided to prevent cars rolling over the embankment. A proper runway for carmen shall be provided.

Order 380—Quarry Stairs and Ladders. (a) Safe and easy access to quarry excavations shall be provided for deep quarries, stairs with numerous landings and secure handrails shall be provided.

(b) All landings and flights shall be securely braced beneath.

(c) Unsecured ladders shall not be used except for short flights as from one quarry bench to another. Lad-

der steps shall be notched in rather than merely spiked to the side supports and shall at all times be kept in good repair.

(d) After safe and adequate means of descent and ascent in quarry excavations have been provided for, strict rules shall be made prohibiting workmen from using any other means than those provided.

(e) All ladders used to gain access to elevated places in quarries shall be of sufficient length to extend at least three feet above the landing, and the top of the ladder shall be firmly secured to the ledge to prevent slipping.

(f) Excavations shall be provided with railings at points where men are regularly employed, or where passageways, tracks, roadways or buildings adjoin such excavations.

Note: Exceptions may be made at points where stripping is being carried on and at points where material and rocks are landed after being hoisted from the pit.

Order 381—Passageways. Passageways regularly used by persons shall be planked overhead at the point of intersection with bucket elevators and conveyor belts to prevent injury from falling stones.

Order 385—Explosives, Storage, Daily Supply. (a) The daily supply of explosives in a quarry shall be kept in a stout, tight box with hinged lids, covered with not less than No. 24 gauge sheet iron, and not more than one hundred pounds of explosives shall at any time be kept or stored therein, and except when necessarily opened for use by authorized persons, shall at all times be kept securely locked. Upon each such magazine there shall at all times be kept conspicuously posted a sign with the words "EXPLOSIVES—DANGEROUS" legibly printed thereon.

(b) Storage—Temporary Locations. When a quarry or pit is of a temporary nature, the magazine may be constructed in accordance with the specifications provided for in paragraph (a). The quantity of explosives kept on hand shall not exceed 200 pounds, and the magazine shall be located not less than 200 feet from any other structure, working place or public highway.

Order 386—Storage, Main Supply. (a) All explosives except detonators in excess of the daily supply authorized to be taken into or stored in the quarry shall be kept or stored in an approved magazine. All magazines shall, unless otherwise authorized by the commission, be located and constructed as follows: It shall be placed not less than 300 feet distant from any other structure or public highway. It shall be constructed of bullet-proof and fire resistant material and shall have no opening except for ventilation and entrance. Doors of such magazine must be fire resistant and bullet-proof and at all times kept closed and securely locked, except when it has to be entered by the person or persons in charge thereof. All nails in the interior of the magazine shall be countersunk. The ground around such magazine shall be kept free from rubbish, dead grass, shrubbery, or other incumbrance.

Note: For the purpose of these orders, a magazine is fire resistant if constructed of cement mortar, tile, or brick, and the door surfaced with sheet metal, or, if of wood construction consisting of double walls filled in with sand or crushed rock and the structure completely surfaced on the outside with not less than No. 26 gauge galvanized iron.

(b) Upon each side of such magazine there shall at all times be kept conspicuously posted a sign with the words "EXPLOSIVES—DANGEROUS" legibly printed.

(c) Magazines shall be ventilated, and the openings for ventilation shall be so screened that sparks of fire may not enter therein.

(d) Magazines shall at all times be kept clean and dry.

(e) Magazines shall be in charge of a person especially appointed for the purpose who shall have in his possession the keys of the magazine, and shall be responsible for the safe storage of explosives contained therein.

(f) All electric wires in any magazine or thaw house shall be protected by fuses and inclosed in a grounded conduit and shall not be brought within 5 feet of the explosives stored therein. Lights for illumination shall be protected with guards.

(g) No naked light shall be introduced into a magazine where powder, explosives or inflammable substance are stored.

Smoking shall not be permitted in a powder magazine, at a powder distributing station, or while handling powder.

(h) When supplies of explosives or fuse are removed from a magazine, those that have been longest in the magazine shall be taken first.

(i) Containers of explosives shall be removed to a safe distance from the magazine before being opened, and no such containers shall be opened with an iron or steel instrument.

Note: The minimum distance of storage magazines from working places, buildings, and highways provided for in Order 386 (a) is 300 feet, but recommended distances set forth in the American Table of Distances printed in the Appendix should be used whenever it is possible or practicable to do so.

Order 387—Storage of Detonators, Crimpers, Capping of Fuses.

(a) No detonators shall be taken into any magazine containing other explosives.

(b) All primers shall be exploded within thirty-six hours after making.

(c) Detonators shall not be removed from original containers except as they are used for capping fuses.

(d) No fuses shall be capped with detonators in any magazine or in any other place where detonators or other explosives are stored, but special benches shall be provided at a safe distance from such storage place, where all fuses shall be capped.

(e) Only a crimper shall be used for attaching fuse to blasting caps. The quarry operator shall furnish and keep in accessible places, ready for use, crimpers in good repair. Broad jaw crimpers shall be used.

(f) Blasting caps and fuse which have become deteriorated by age or improper storage shall not be used for blasting purposes and shall be destroyed.

Order 388—Thawing Dynamite. (a) Every quarry thawing dynamite or other high explosives containing nitro-glycerin shall be provided with a separate place for that purpose and explosives shall not be thawed in any other place or in any other manner than as provided for in this order.

(b) Dynamite or other explosives containing nitro-glycerin shall not be thawed by any means other than indirect steam heat or a hot water device or by manure, or by electric current. If steam or water be the agent em-

ployed, the stove, boiler or other primary source of heat shall not be nearer to the thawing room than ten feet. If electric current be the thawing agent, the current shall not be brought within five feet of the explosives to be thawed; and in no case shall these explosives while being thawed be exposed to a temperature higher than ninety degrees F. The place for thawing shall be so arranged that the boxes or loose powder shall not come in direct contact with the hot water pipes or other source of heat.

(c) Dynamite or other explosives shall not be thawed by placing near a fire or near a steam boiler. Dynamite or other explosives containing nitro-glycerin shall not be thawed by direct contact with steam.

Order 389—Explosives, Blasting, Conveying, Misfires, Etc.

(a) *Blasters.* Only experienced men who have been selected and regularly designated by the superintendent in charge shall handle, transport, prepare or use dynamite or other high explosives.

(b) *Number of Blasters, Responsibility.* There shall be one blaster in charge of blasting in each section and he shall enforce his orders and directions and personally supervise the fixing of all charges and all other blasting operations and shall use every precaution to insure safety.

(c) *Conveying Explosives.* Explosives shall be conveyed in a suitable covered wooden box or in sacks provided for that purpose. Detonators shall be conveyed to the working place in a separate container from that for the explosive. The carrying container for fuse and caps should be of rigid construction, and have a soft lining for better protection of the detonators.

After blasting is completed, all explosives and detonators shall be returned at once to the regular storage places, observing the same rules as when bringing them to the work.

(d) *Frozen Dynamite.* No blaster shall attempt to use dynamite that is frozen.

(e) *Counting Shots, Misfires.* When a blaster fires a round of holes he shall count the number of shots explod-

ing, except in cases of instantaneous blasting by electricity. If there are any misfires, no person shall be permitted to approach the shot until one-half hour shall have elapsed lest the trouble be a hangfire and not a misfire.

(f) *Misfires, Treatment.* Whenever feasible, a charge that has failed to explode shall be exploded by inserting a new primer in the hole on the old charge and detonating such primer.

(g) *Firing by Electricity.* When firing by electricity from power or lighting wires in any quarry, a proper switch shall be furnished with lever down when "off." The switch shall be fixed in a locked box or room to which no person shall have access except the blaster. The lead wires shall be furnished with plugs and shall not be connected with the switch till ready to fire. After blasting, the switch lever shall be pulled out, the wires disconnected, and the box or room locked before any person shall be allowed to return, and shall remain so locked until again ready to blast.

(h) *Shot Firing Cables.* Special precautions shall be taken against shot firing cables or wires coming into contact with lighting, power or other circuits or with any metal pipe lines. All portable devices for generating or supplying electricity for shot firing shall be in charge of a boss or shot firer. No person other than a boss or shot firer shall connect the firing machine or battery to the shot firing leader and such connection shall not be made until all other steps preparatory to the firing of a shot shall have been completed and the men removed to a safe distance.

(i) *Examination After Blast.* Before drilling is commenced on any shift, all remaining holes shall be examined with a wooden stick for unexploded charges or cartridges, and if any are found, same shall be refired before work proceeds.

(j) *Deepening Old Holes.* No person shall be allowed to deepen holes that have previously contained explosives.

(k) *Tracing Firing Wires.* All wires in broken rock shall be carefully traced and search made for unexploded cartridges.

(l) *Galvanometers.* When firing electrically, individual electric detonators shall be tested with a galvanometer, both before and after loading.

(m) *Fuse Lengths.* No man shall "spit" more than ten fuses at one time. In no case shall the length of any forty (40) second fuse be less than eighteen (18) inches or any thirty (30) second fuse be less than twenty-four (24) inches. The length of the fuse and the number of shots that any one person shall be permitted or required to light at any one time shall be in accordance with the following table:

TABLE OF FUSE LENGTHS

Number of Holes to be Lighted at one Time	Length of Fuse per Shot			
	40 Sec.		30 Sec.	
	Ins.	Time	Ins.	Time
1	18	1' 00"	24	1' 00"
2	20		27	
3	22		30	
4	24	1' 20"	33	1' 15"
5	26		36	
6	28		39	
7	30	1' 40"	42	1' 42"
8	32		45	
9	34		48	
10	36	2' 00"	51	2' 10"
(1)	(2)	(3)	(4)	(5)

Note: Column (1) Indicates the various numbers of holes up to 10 which may be lighted at one time by one person provided the length of fuse for each hole agrees with the number of inches shown in Column (2) if 40 second fuse is used or in Column (4) if 30 second fuse is used. For convenience Columns (3) and (5) are included to show the burning rate of 40 second and 30 second fuses respectively in steps of 6 inches each. Thus: for example, if 10 holes are to be lighted at one time, the first hole to be lighted must have 36 inches of 40 second fuse or 51 inches of 30 second fuse.

(n) *Warning Signals.* A warning signal consisting of a whistle, siren or bell shall be provided and sounded both before and after each shot with sufficient interval to permit men to reach sheltered places and to announce that no further shots are to be fired.

(o) *Blasting Shelters.* Bomb-proof shelters of concrete, metal, stone, or timber sufficiently substantial to withstand flying rock from secondary shots shall be provided at a safe distance from the working face and shall be of necessary capacity to accommodate all men working in the quarry. During primary blasting, employees shall not be permitted to stand in the open and a place behind some object or barrier sufficient to withstand the force of flying rocks shall be selected and used. No shot shall be fired until all men have retired from the danger zone and are in the shelter provided for, except however, this order shall not apply to those men whose duty it is to warn the public.

Where highways or driveways are located within the danger zone, employees shall be sent in each direction to warn the public when shots are to be fired. The persons giving the warning shall proceed to a distance of not less than 500 feet from the blast and warning shall be accomplished by waving a red flag.

Note: A metal sign with the words "STOP—BLASTING" printed thereon and attached to a pointed rod should be provided by employers in addition to the red flag. The sign should be placed in the middle of or at the side of the highway by the persons warning the public when blasting.

(p) *Secondary Blasting.* Secondary blasting on rock piles when the mud-capping method is used shall be conducted by successive stages. Boulders located at the foot of the piles shall be blasted separately from the boulders located midway or near the top of the slope, thus preventing the rolling of rocks on unexploded charges and consequently being thrown to a considerable distance.

(q) *Tamping Bars and Powder Punches.* All tamping bars and powder punches shall be of wood, or non-sparking metal.

III. APPENDIX

Suggestions And Recommendations

It is recommended that each workman employed in the quarry shall have his attention directed by the quarry superintendent or one of his assistants to the provisions of the miscellaneous rules, which apply to quarry employees. A notice should also be posted in a conspicuous place to the effect that quarry employees must read these rules and be governed by them.

MISCELLANEOUS RULES FOR QUARRYMEN

1. **Reporting Injuries.** In case of accident, no matter how slight, even a slight cut or break of the skin, report to your foreman at once and have it taken care of in a clean way.

2. **Loose Rocks Overhead.** When working in the quarry always look out for loose rock above, which may fall and injure you. A small rock the size of your fist, if it falls thirty feet, may kill you.

3. **Rocks Fall from Piles.** Be careful when working around piles of stone. There is always danger that a rock may become loosened and fall and strike you.

4. **Stepping on Stones.** Before stepping on a stone always look to see that it is solid. A rocking stone may cause you to lose your footing and fall and break your leg.

5. **Hoisting Stone.** In hoisting stone or grout boxes with the derrick, there is only one safe rule for the men in the quarry to follow: Don't stand under. The moment the stone or box starts to rise, get away to a safe distance. If cable is twisted, by all means use the hook or lower to ground to right same.

6. Swinging Derrick. When working near the derrick, always look out for the swinging boom. You are liable to be struck and injured by the stone or chain.

7. Talking to Hoistman or Signal Man. It is always dangerous to talk to the hoistman or signal man. Remember that if you attract their attention from their work for only a minute it may cause them to make a serious mistake and the lives of the men in the quarry may be in danger.

8. Dragging Stone. In dragging stone, do not stand in front. The cable or hook may break and strike you.

9. Wedging Stone. In wedging stone apart, always insert a stone or wedge in the break before you insert your hands. When driving wedges, stand in line with your break; many have been severely crushed by the stone falling sideways.

10. Protect Your Eyes. Paving cutters, stone cutters and others who work where chips and small particles fly in the air, are required to wear goggles to protect their eyes. Remember you have only two eyes and one or both may be blinded by a small chip.

11. Walking on Tracks. Be careful when walking on the car tracks. You are always in danger of being struck by the cars.

12. Mushroom Heads. Mushroom heads on chisels, points and tracers are always dangerous for the reason that when struck by the hammer a small part may be broken off and fly in the eye. Many men have lost an eye because they did not properly trim the heads of these tools.

13. Danger at Bottom of Incline. When the car is going up the incline of the crusher, don't follow it or stand on the track at the foot of the incline. There is always danger that the cable may break or some other part give way, and you may be struck by the car and be killed.

14. Sledges Caught in Awning. Paving cutters should be careful to construct the supports or framework for their tents high enough so that in working, the sledge

hammer will not catch in the canvas and cause an accident to yourself and others.

15. Report Dangerous Conditions. Every man in this quarry must report to his foreman any condition or dangerous practice which he thinks may cause an accident. The only way to have a safe quarry is for every man to do his part.

16. Compressed Air is Dangerous. Compressed air must not be used for cleaning clothes or for horse play. Pointing air hose at persons has resulted in serious injuries, and is strictly forbidden.

17. Replace Guards. Mechanical guards removed for the purpose of repairs or adjustment to machinery must be replaced immediately.

18. Oiling, Adjusting, Cleaning Machinery. Do not attempt to reach in or about machinery in motion for purposes of oiling, adjusting or cleaning.

19. Belt Dressing. Do not attempt to apply dressing on belts next to pulley as the hand or arm may be drawn in.

20. Gravel Banks. Do not expose yourself directly to gravel banks that are vertical or undermined or where overhangs exist at the top. Slides and falls of gravel or earth nearly always result in serious or fatal injury to persons so exposed.

USE OF EXPLOSIVES

The handling of explosives is dangerous business. Every man must observe the following rules:

21. Forcing Primer. Do not force a primer into a bore hole.

22. Smoking Forbidden. Smoking while handling explosives is strictly forbidden.

23. Use Wooden Tamping Sticks. All tamping bars and powder punches shall be of wood or non-sparking metal.

24. Care of Explosives. Fuse, caps and powder must not be left lying about the quarry. All caps or primers or sticks or pieces of dynamite found lying about the quarry must be immediately put in the regular storage places.

25. Caps Kept Separate from Dynamite. Blasting caps must not be kept in the same box with, or close to dynamite.

26. Do Not Carry Caps in Pocket. Do not carry blasting caps in your pocket, and don't tap or otherwise investigate same.

27. Removing Blasting Caps from Box. Do not attempt to remove blasting caps from boxes by inserting nails or any sharp instrument.

28. Use Crimper for Capping Fuses. Only a crimper shall be used for attaching fuse to blasting caps. Do not use your teeth or knife.

29. When Dynamite Fails to Explode. When a blast has been fired and it is not certain that all charges have exploded, no person shall enter the place where such charges were placed within 30 minutes after the explosion.

30. Opening Powder Cans. You must not open a metal keg of powder with a pick or metal object. Use the opening provided by the manufacturer of the keg.

31. Missed Holes. No person shall be permitted to extract, or attempt to extract, explosives from a "missed hole", but shall when possible, put in a new primer and blast again. When not possible to do this, wait for orders from the foreman.

32. Spitting Fuses. No man shall "spit" more than ten fuses at one time, and should it be necessary to blast a greater number of holes than ten, he must have assistance.

33. Warning for Blast. When ready to fire shots, warnings must be given in every direction, and all entrances to the place or places where charges are to be fired shall be guarded so far as possible.

34. When shots are to be fired, all persons must enter the shelter provided for protection from flying stones.

AMERICAN TABLE OF DISTANCES

Pounds of Explosives	Inhabited Buildings Barricaded* (Feet)	Public Railway Barricaded* (Feet)	Public Highway Barricaded* (Feet)
50	120	70	35
100	180	110	55
200	260	155	75
300	320	190	95
400	360	215	110
500	400	240	120
600	430	260	130
700	460	275	140
800	490	295	150
900	510	305	155
1,000	530	320	160
1,500	600	360	180
2,000	650	390	195
3,000	710	425	210
4,000	750	450	225
5,000	780	470	235
6,000	805	485	245
7,000	830	500	250
8,000	850	510	255
9,000	870	520	260
10,000	890	535	265
15,000	975	585	290
20,000	1,055	635	315
25,000	1,130	680	340
30,000	1,205	725	360
35,000	1,275	765	380
40,000	1,340	805	400
45,000	1,400	840	420

*Barricaded, as here used, signifies that the building containing explosives is screened from other buildings, railways, or from highways by either natural or artificial barriers. Where such barriers do not exist, the distances should be doubled.

FIRST AID

At all quarries and pits two or more employees depending on the number employed should receive thorough First Aid training. Persons shall be considered to be thoroughly trained when they are able to administer first aid treatment for shock, bleeding, burns, cuts, bruises, sprains, fractures and dislocations; they shall be able to administer artificial respiration by the prone or Schaefer method and understand the proper methods of transporting the injured. The superintendent of the quarry or pit should provide for instruction of the employees from time

to time, not less than once or twice each year, in the proper handling and treatment of injured persons before the arrival of a physician. Such instructions may be given by a physician or by any competent first aid instructor. The United States Bureau of Mines has been providing a source of training in the mines and quarries each year. When the Mine Safety Service Car makes its next appearance in the vicinity, the superintendent should see to it that his men receive the proper training.

SAFE PRACTICES

The enforcement of the safety rules necessary in a quarry or pit is no easy problem. It is easy enough to get up a set of rules that may be practical enough, but quite another matter to enforce their observance. It certainly requires an understanding of human nature by those who administer them. There should be no partiality shown. Preference, if any, should be given the men that make good and then there can be no personal favoritism. Letting one man escape while another is reprimanded for an infraction soon leads to loss of respect for all rules and finally for the boss himself. Any person placed in a position of supervision over others must understand thoroughly that particular work and its principles and try to elucidate these principles for the men intrusted to him. He is then in a position to teach the safest and most efficient manner in which to do the work. This must always be done in such a way as not to induce stubbornness, resentment or a feeling being humiliated, but by kindly correction and proper guidance aim to make the man a more efficient worker and, at the same time, a safer one. The supervisor must teach his pupil to recognize up-to-date methods and have him see the advisability of cooperating in the enforcement of the rules that have been devised for his own and his fellow workers' safety. Discipline in such an undertaking as mining or quarrying should be considered indispensable and should be maintained at all times.

SAFETY COMMITTEES

The Industrial Commission recommends that safety committees be organized in all quarries. In the smaller quarries, the superintendent should have charge of the safety work. He should see that proper safety rules and regulations are enforced; should see that new employees are instructed as to the hazards of their work and that all employees are educated in safety methods through safety bulletins, printed rules and oral instructions.

In the larger quarries employing over forty men, it is necessary to have a General Safety Committee. This committee should be composed of not less than three persons: two practical quarrymen, and a foreman. The committee should devise ways and means to reduce the number of injuries and to carry on safety education among the men by means of literature, posters, and practical safety exhibitions. The committee should hold frequent meetings and should encourage the men to make safety suggestions. All practical suggestions should be acted upon by the committee. All accidents should be investigated and means taken to prevent similar occurrences.

IV. EXTRACTS FROM THE STATUTES AND GENERAL ORDERS OF THE INDUSTRIAL COMMISSION OF IMPORTANCE TO QUARRYMEN

EXTRACTS FROM CHILD LABOR LAW

Section 103.05 (3) *** the employments and places of employment designated in the following schedule shall be deemed to be dangerous to the life, health, safety and welfare of minors *** under the ages specified:

* * *

(b) Minors under eighteen years of age

* * *

(9) Mine or quarry; in or about.

Section 103.15 (1) (a) Any employer who shall employ, or permit any minor *** in any employment in violation of any of the provisions of Section 103.05 to 103.15, inclusive *** of the Statutes *** shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be fined not less than ten dollars nor more than one hundred dollars for each offense, or imprisoned in the county jail not more than thirty days. Every day during which such violation continues shall constitute a separate and distinct offense.

(b) The penalties specified in paragraph (a) of this section may be recovered by the state against the employer in an action for debt brought before any court of competent jurisdiction.

Note: The employer is charged with the duty of ascertaining, at his peril, the age of minors and of employing persons of lawful age only. False statements of the minor or his parents, as to the age of the minor, are not a defense for the employer. *Peter Stetz vs. F. Mayer Boot & Shoe Co.*, 163 Wis. 151. For their own protection employers should require all minors to furnish documentary proof of age, such as a certified copy of the birth or baptismal record.

OTHER SAFETY ORDERS APPLICABLE

Every operator of a quarry or pit should familiarize himself with the other safety orders issued by the Industrial Commission, which have been grouped into codes. In par-

ticular, he should be familiar with the provisions of the following codes: General Orders on Safety, applying to transmission apparatus, such as belts, pulleys, flywheels, shafting, and other danger points common to all industries; General Orders on Sanitation, dealing with ventilation and toilet facilities; and the Electrical Code, dealing with the construction, use and maintenance of electrical equipment.

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