

*A. Flint*

INDUSTRIAL COMMISSION OF WISCONSIN

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Effective January 7, 1922

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**GENERAL ORDERS ON QUARRIES**

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## I. INTRODUCTION.

Section 2394—48 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
F. 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

After two meetings this advisory committee on July 14, 1921, recommended tentative orders to be submitted to public hearings. Such public hearings were held during October and November at Wausau, Fond du Lac, and Milwaukee, and were attended by large numbers of quarrymen and other interested parties. The suggestions which were offered at these public hearings were then transmitted to the members of the advisory committee, and practically all of them were incorporated in the final draft of these orders which were recommended to the commission for adoption.

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 De-

cember 6, 1921, and pursuant to law, became effective January 7, 1922.

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. If an accident results because of the violation of any lawful general order of the Industrial Commission, the employer, under Paragraph (h) of Section 2394—9 (5), moreover, 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 SAFETY IN QUARRIES.

**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 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.

(c) *Definition of Quarry.* The term "quarry" 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.

**Note:** Section 2398-48 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 2394-9.5 (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 2394-48.

The attention of superintendents and foremen and of other persons having control of any employee or any operation, however, is directed to the fact that the term "employer" as used in section 2394-48 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.

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

(e) *Quarry Foreman.* The term "quarry 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—Care of the Injured.** (a) It shall be the duty of the operators, superintendents, or anyone in charge of any quarry, to keep at such place about the quarry as may be designated by the Industrial Commission, a stretcher, a woolen blanket, in good condition for use in carrying any person who may be injured at the quarry. At all quarries an adequate supply of materials shall be kept readily accessible for the treatment of anyone injured and shall include the following in suitable quantity: First-aid outfits consisting of one extra long gauze bandage with compress sewed in its center, one triangular bandage with methods of application printed thereon, two safety pins, and one card of instructions; large first-aid dressings for wounds; package of sterilized gauze; assorted bandages; United States Army tourniquet; carbolated vaseline or boric acid ointment; tincture iodine  $\frac{1}{2}$  U. S. P.; packages of absorbent cotton; safety pins; shears, tweezers, aromatic spirits of ammonia; paper cups; first-aid book of instructions; soap; basins; towels.

(b) It shall be the duty of the foreman or superintendent to have at least two men employed at the quarry receive instructions from a competent person in the proper handling and treatment of injured persons before the arrival of a physician. These instructions should be received from time to time, not less than once in every six months.

**Order 363—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 364—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 shall inspect or cause some competent person or persons appointed by him to inspect all quarrying appliances, boilers, engines, magazines, explosives, signalling devices, tracks, ladders, dry closets, and all parts and appliances of said quarry in actual use, and any such person or persons appointed by the said 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 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 said superintendent of every magazine containing explosives situated on said quarrying property, and to make such other appointments and perform such other duties as are provided by these orders to be performed by such superintendent.

**Order 365—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 employes.

(b) Where necessary watchmen shall be employed at each face to warn the men in the quarry when loose rocks are about to fall.

(c) Sand and gravel pits shall be given a slope that will eliminate the danger of cave-ins based upon the experience of such pit.

**Order 366—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.

**Order 367—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 car men shall be provided.

**Order 370—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 380—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 381—Hoisting Men.** No person shall be hoisted out of or lowered into a quarry. Employes shall not be permitted to ride on conveyor or elevator belts.

**Order 385—Explosives.** (a) The daily supply of explosives in a quarry shall be kept in a stout, tight box with hinged lids 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) 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.

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

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

Magazines shall at all times be kept clean and dry.

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.

(c) 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. The light shall be protected with guards.

(d) 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.

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

(f) 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.

**Order 386—Storage of Detonators, Crimpers, Capping of Fuses.** (a) No detonators shall be taken into any magazine containing other explosives.

No detonator shall be transported with other explosives except when being carried to the face for immediate use.

(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.

**Order 387—Tamping Bars and Powder Punches.** All tamping bars and powder punches shall be of wood, or non-sparking metal.

**Order 388—Thawing Dynamite.** (a) Every quarry thawing dynamite or other high explosives containing nitro-glycerine 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-glycerine 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 employed, 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-glycerine shall not be thawed by direct contact with steam.

**Order 389—Blasting.** (a) Bosses and shot firers about to fire shots, shall cause warnings to 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.

(b) 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.

(c) 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.

(d) Suitable and convenient shelters shall be provided.

**Note:** Wooden sheds or buildings shall not be deemed sufficient shelter from blasts.

**Order 391—Overburden.** All places in quarry excavations where men are or may be regularly employed, the stripping walls of soil or overburden shall not be made continuous with the quarry walls and shall be protected either by

(1) If the stripped surface is narrow, or if it slants toward the excavation in such a manner that there is a possibility of material falling over the edge a protecting fence or barrier shall be maintained along the edge of the pit, or

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

**Order 392—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 393—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.

**Order 394—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. Ladder 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) 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 395—Hoists.** Exposed cables, where they pass through sheaves shall be guarded.

**Order 396—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.

### 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 employes. A notice shall also be posted in a conspicuous place to the effect that quarry employes 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 Men.** It is always dangerous to talk to the hoistmen 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 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.

#### USE OF EXPLOSIVES

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

17. **Forcing Primer.** Do not force a primer into a bore hole.
18. **Smoking Forbidden.** Smoking while handling explosives is strictly forbidden.
19. **Use Wooden Tamping Sticks.** All tamping bars and powder punches shall be of wood or non-sparking metal.
20. **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 a safe place.
21. **Caps Kept Separate from Dynamite.** Blasting caps must not be kept in the same box with, or close to dynamite.
22. **Don't Carry Caps in Pocket.** Don't carry blasting caps in your pocket, and don't tap or otherwise investigate same.
23. **Removing Blasting Caps from Box.** Don't attempt to remove blasting caps from boxes by inserting nails or any sharp instrument.
24. **Use Crimper for Capping Fuses.** Only a crimper shall be used for attaching fuse to blasting caps. Do not use your teeth or knife.
25. **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.

26. **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.

27. **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.

28. **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.

29. **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.

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

##### EXTRACTS FROM CHILD LABOR LAW

Section 1728a. \*\*\* 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 1728e. 1. (a) Any employer who shall employ, or permit any minor \*\*\* in any employment in violation of any of the provisions of Section 1728a \*\*\* 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.

##### EXTRACTS FROM THE GENERAL ORDERS ON SAFETY

**Order 1—Belts—Guards.** All belts, ropes or chain driving machinery or shafting, and all secondary belts, ropes or chains; in short, all belts, ropes or chains, exposed to contact, except belts which are so small or those which move so slowly that there is no possibility of danger, must be guarded.

In all cases the point where the belt, rope or chain runs on to the pulley, sheave or sprocket, must be guarded.

All horizontal belts, ropes or chain driving machinery or shafting, seven feet or less from the floor, where exposed to contact, must be guarded.

**Note (a):** The terms "belts" or "secondary belts" mean belts which transmit power and do not apply to sanding or polishing belts, or belts used for abrasive purposes; such belts must be guarded where possible.

**Note (b):** In guarding overhead belts or rope drives, unless so guarded that persons cannot pass under them, the width of the guard should not be less than the width of the belt or rope drive and the length should not be less than the distance between the outer faces of the two pulleys. It should cover the outer faces of the two pulleys or sheaves and extend upward to such a point, and be attached in such a way that in case the belt breaks it will withstand the whipping force of the belt.

**Note (c):** In rooms, or parts of rooms, used exclusively for transmission machinery, such as the ground floor of sawmills and the basements of paper mills or flour mills, it has been found practical to define certain passageways for the use of oilers and millwrights and to guard the pulleys, belts and shafts along these passageways.

**Order 2—Pulleys—Guards.** All pulleys over 18 inches in diameter, which are exposed to contact, must be guarded.

**Order 3—Loose Pulleys.** All machines, not individually motor driven, must be equipped with a loose pulley or a clutch or some other adequate means of stopping the machine quickly.

**Order 4—Belt-Shifters.** All loose pulleys must be furnished with a permanent belt shifter, so located as to be within easy reach of the operator. The belt-shifter must be so constructed as to make it impossible for the belt to creep from the loose pulley back on the tight pulley.

All belt-shifters must be equipped with a lock or some other efficient device which will prevent the shifter from being accidentally shifted.

**Order 5—Pulleys Near Shaft Hanger.** Pulleys must be so placed as to allow the width of the belt between two pulleys, or between the pulley and the shaft hanger, or a hook must be provided, or a guard placed adjacent to the pulley to prevent the belt from leaving the pulley.

**Order 6—Clutches.** All clutches must be guarded.

**Note:** Practically all clutches have protruding parts or shafts which make them as dangerous as set screws on shafts.

**Order 8—Emery Wheels, Hoods and Guards.** Emery wheels used for grinding purposes must be equipped with a hood connected with an exhaust fan or water system. A guard must be provided, as a part of the hood construction or

in addition to the hood, which shall be strong enough to withstand the shock of a bursting wheel. This guard must be adjusted close to the wheel and extend over the top of the wheel to a point 30 degrees beyond a vertical line drawn through the center of the wheel. The exhaust or water system is not required on emery wheels which are in general use by all employes in common, to touch up tools or castings, or emery wheels used for sharpening saws.

**Order 9—Fly Wheels.** All sections of flywheels, with spokes, which are 6 feet or less from the floor and which are exposed to contact must be guarded. Flywheels which run in pits must be provided with toe boards around the pit.

**Exception:** Where an engine is isolated in a room used exclusively as an engine room the flywheel of such engine may be guarded with a railing. This railing must be not less than 30 inches in height and must be constructed with two rails, the bottom rail of which must be not less than 18 inches from the floor.

**Order 10—Friction Drives.** The contact faces of all friction drives, when exposed to contact, must be enclosed.

All arm or spoke friction drives and all web friction drives with holes in the web, when such friction drives are over 18 inches in diameter, and exposed to contact, must be entirely enclosed. All friction drives with projecting bolts where exposed to contact, must be guarded.

**Order 11—Gears.** All gears, where exposed to contact, must be entirely enclosed or equipped with a flange guard which must enclose the teeth of the gears. All arm or spoke gears and all web gears with holes in the web, which are over 18 inches in diameter, where exposed to contact, must be entirely enclosed.

**Order 12—Keys and Keyseats.** All projecting keys in shafting, where exposed to contact, must be cut off or guarded, and all keyseats in end of shafts, where exposed to contact, must be filled or guarded.

**Exception:** Keyseats on machines where it is impossible to guard or fill the keyseats without interfering with the operation of the machine, and where such keyseats are in shafts which are so small or run so slowly that there is no danger.

**Order 13—Ladder with Steel Points.** All portable ladders must be equipped with steel points or steel feet on the bottom or other effective means of preventing slipping.

**Note:** Where steel points or steel feet are used they should be kept sharp, especially when used on concrete floors.

**Order 14—Passageways—Keep Clear.** All passageways and gangways must be kept smooth and in good repair and free from nails or obstructions over which persons may stumble and fall.

**Order 15—Platforms with Stairways or Stationary Ladders.** All permanent elevated platforms in frequent use must be equipped with a permanent stairway or stationary ladder. Ladders other than stepladders, used to gain access to elevated platforms not frequently used, must be provided with safety hooks at the top.

**Order 16—Runways and Platforms, Rails and Toe Boards.** All elevated walks, runways or platforms, except on loading or unloading side of platforms, must be provided with a guard rail. A toe board must be provided to prevent parts from falling off.

**Order 17—Set Screws.** All set screws on moving parts, where exposed to contact, must be countersunk or protected by a solid collar, or a headless set screw must be used. No part of the set screws must project above the surface.

**Order No. 18, Covering Shafting,** has been amended to read: "All transmission shafting located in places of employment, where exposed to contact, must be guarded."

**Note:** The necessity for this amendment is proved by the fact that several accidents have occurred recently on shafting located higher than 6½ feet from the floor near a platform or runway where oilers and millwrights were required to go. The original order required only that shafting less than 6½ feet from the floor should be guarded.

**Order 19—Sprockets.** All sprockets exposed to contact must be guarded.

**Order 20—Stairways—Handrails.** All stairways must be equipped with handrails, and the rails must be kept smooth and free from nails and splinters. Where the stairway is not built next to a wall or partition, rails must be provided for both sides.

**Order 21—Engine Crank Shaft.** The crank shaft and crank disc on all engines, where exposed to contact, must be guarded.

**Order 22—Stairs or Platforms Located on Engines.** All stair steps and platforms located on engines or large machines for the use of operators and oilers must have a rough or non-slip surface to prevent slipping.

**Order 24—Automatic Oilers.** All parts of engines and other machines which need frequent oiling when the machine is in motion, and when the oil cup is so located as to make it dangerous to reach while the machine is in motion, must be equipped with automatic oilers, or some other means must be provided to guard the oiler.

**Order 25—Projecting Part on Shafts.** All projecting parts on revolving shafts such as collars, clamps, split links, couplings, etc., where such parts are dangerous and are exposed to contact, must be guarded.

**Order 26—Means to Disconnect Power.** In each room of a place of employment, where machinery is used, means must be provided by which the power can be disconnected from the machines and line shafts.

**Order 32—Locks for Tripping Device.** All presses, drop hammers, and other machines which are set in motion with a tripping device, must be so equipped that when not in use or when being adjusted or repaired the trip can be locked or blocked so that it cannot be accidentally tripped.

**Exception:** Where machines are driven with individual motors and where the switch to such motor is so located that it can be conveniently reached by the operator while operating the machine.

**Order 33—Revolving Stock.** All revolving stock which projects from the end of machines, such as tool and turret lathes, and automatic machines, must be guarded.

**Order 34—Fans.** All fans, when exposed to contact, must be guarded.

**Order 35—Revolving Drums and Cylinders.** All revolving barrels, drums or cylinders, such as rattlers, cleaners, churns, etc., where dangerous and where exposed to contact, must be guarded.

**Order 36—Counterweights.** All counterweights, where exposed to contact, must be guarded.

**Order 37—Overhead Trolleys.** All overhead trolleys such as are used in shops, must be so constructed, or so guarded, as to make it impossible for the carriage to jump the track or run off the track at the end or at the switch.

**Order 38—Valves, Access to.** Where valves in daily use which cannot be operated from the floor are located higher than ten feet above the floor, a platform with stairs or stationary ladder must be provided.

**Order 40—Crane Truck Wheels.** The truck wheels of all overhead traveling cranes must be guarded.

**Order 41—Cranes—Runways.** All overhead electric traveling cranes must be equipped with a runway on one side which must extend the full length of the crane bridge. Such runways must be equipped with a substantial railing and toe boards. The cracks between the boards of the floor of such runway or platform must not be wider than  $\frac{1}{4}$  inch.

**Order 42—Cranes—Switch in Cab.** In the cab of every overhead electrical traveling crane a switch must be provided which will enable the operator to cut off the current from the crane.

**Order 43—Cranes—Stairway.** All overhead electrical traveling cranes must be provided with a stairway or permanent ladder which will give safe access to the crane cab. If stairway is used it must be equipped with a substantial railing. If ladder is used it must extend not less than 4 feet above the floor of the crane cab.

**Order 44—Crane Cabs Enclosed.** The crane cabs of all overhead electrical traveling cranes must have a solid floor and must be enclosed on sides either with a solid enclosure or a railing to a height of not less than 36 inches. If a railing is used toe boards must be provided.

**Order 46—Eye Protection.** Where men are doing work whereby any substance is thrown off which may injure the eyes, suitable goggles or spectacles or other efficient guard must be provided by the employer.

**Note:** The compensation law provides for a penalty of 15 per cent where injury results from the employee's willful failure to use safety devices provided by the employer or to obey any reasonable rule adopted by the employer for the safety of the employees.

Where properly fitted goggles are furnished by the employer and where the employee refuses to use the goggles and is injured, the employee will be penalized 15 per cent in awarding compensation. By the term "properly fitted" is meant goggles which fit comfortably over the nose and around the eyes and the lenses are properly spaced for the eyes.

**Order 52—Rolls, Wheels and Brushes.** All rolls, wheels and brushes when exposed to contact and when they revolve in such a way with regard to other revolving or stationary parts that a person may be accidentally caught and drawn in, must be guarded.

**Order 53—Excavations.** All excavations, when so located that persons may accidentally fall into them must be guarded, and at night must be equipped with a red light. All excavations which are located in sandy or wet soil, or any soil which is liable to cave in must be securely shored up.

**Order 55—Pits, Openings in Floor, etc.** All pits, manholes, and openings in floors, platforms and sidewalks, must be guarded. If trap doors are used the door and hinges must be flush with the floor and the door must have a rough or non-slip surface.

**Order 57—Doorways Near Railroad Tracks.** When a doorway or corner of a building is located near a railroad or trolley track so that a person is liable to suddenly and unexpectedly walk out onto the track in front of approaching engine or cars an efficient guard must be installed with a warning sign.

**Note:** One type of efficient guard in use in many plants consists of a strong bar located at the door or corner and extending across the tracks. When cars are being switched the switchman must go ahead and swing the bar back so that it extends across the door or pathway as a guard. A warning sign and a red light are attached to the bar.

Where practicable, the uprights which support the guard should be placed not less than six feet from the tracks in order to provide safe clearance.

**Order 58—Walks and Platforms for Overhead Work.** Where ladders are not used when oiling overhead shafting and machinery, or doing other overhead work, a runway or platform equipped with toe boards and handrails must be provided. The cracks between the boards of the floor of such runway or platform must not be wider than one-fourth inch. Such runway or platform must be so placed as to make it convenient and safe for the workman to do his work. A permanent ladder, or stairway equipped with handrails must be provided to reach such runway or platform.

**Order 59—Trestles and Walks.** All trestles on which cars run, which are also used as walkways for men must be

equipped with a walkway on the outer edge, so located as to give safe clearance to cars. Such walkways must be equipped with toe boards and handrails. Where a trestle crosses a driveway or passageway the trestle over such points must be solidly boarded over.

Exception to the above order is made on trestles such as those located in coal or ore yards when the cars dump on the side of the trestle. On such trestles the cars must be automatically dumped where practicable.

**Order 203—Circular Saws.** All circular saws must be guarded and all such saws used for ripping, other than self feed saws, must be equipped with a splitter. All other saws, where possible, must be equipped with a splitter.

**Exception:** On saws while specific work is being done where it is impossible to do the work when the saw is guarded.

#### EXTRACTS FROM THE GENERAL ORDERS ON SANITATION

##### Order 2000—Definitions:

*"Pure, Fresh and Clean Air"* shall mean air that is both stimulating and refreshing to breathe. It shall not contain noxious gases, dust, fumes, vapor, or other materials in such quantities as to be injurious to the health. It does not necessarily mean outside atmosphere, but shall mean air that contains reasonable quantities or the vital constituents of the atmosphere.

*"Ventilating System"* shall mean any building construction, machinery or equipment so arranged that "pure, fresh and clean air" is provided for breathing purposes.

*"Exhaust System"* shall mean any building construction, machinery or equipment so arranged that noxious gases, dusts, fumes, vapor or other material injurious to the health are removed from, or prevented from contaminating the air any employe must breathe.

**Order 2010. Purity of Air.**—The air, which any employe must breathe, shall be pure, fresh and clean.

**Order 2020. Ventilating Systems.** Ventilating systems shall be provided for all places of employment where smoke, gas, dust, fumes, vapor, foul air, vitiated air, or industrial poisons are used, stored, handled, or are present in the air in sufficient quantities to obstruct the vision, or to be irritating or to be injurious to health, and when there is available less than 1,000 cubic feet of air space per person. Ventilating systems must replace the air twice each hour and supply an

additional amount of air to make up for losses or contamination of air or oxygen due to the nature of the work being carried on. All ventilating systems shall furnish as a minimum requirement 1,800 cubic feet of pure, fresh and clean air per person each hour.

**Order 2021. Exhaust Systems.** When required. Exhaust systems shall be provided for all machines, vats, tanks, furnaces, forges, salamanders, and all equipment and processes which create and throw off dust sufficiently light to float in the air or which emit fumes, gas or smoke in such quantities as to be irritating, or injurious to the health, unless the general ventilating system keeps the air which any employe must breathe, pure, fresh and clean.

**Order 2200. Toilet Rooms Required.** Every place of employment, whether heretofore or hereafter constructed, shall have adequate toilet rooms, completely enclosed, and so arranged as to insure privacy; except that in foundries, rolling mills, blast furnaces, tanneries, and such other similar buildings as are specified by the Industrial Commission, partitions enclosing toilets shall be at least seven feet high, but need not be carried to the ceiling nor enclosed at the top, provided such ceiling is at least 15 feet high, and provided such toilets are located in rooms where females are not allowed to enter.

**Note:** The above exception will be permitted even though the ceiling is lower than 15 feet, if local ventilation through the closet bowl is provided in a manner approved by the Industrial Commission or the State Board of Health. Toilet rooms should, if possible, be placed on each occupied floor, especially in factories. Much time may thus be saved.

**Order 2203. Number of Closets and Urinals.** In every place of employment, whether heretofore or hereafter constructed, one water-closet shall be provided for every 20 persons, or fraction thereof, of either sex.

In addition thereto, where more than 10 males are employed, one urinal shall be provided for every 40 males, or fraction. Where not more than 10 males are employed, either a urinal shall be provided or the water-closet shall have a projecting lip and self-rising seat. Where trough urinals are used, each two feet of trough shall constitute one urinal.

**Order 2204. Cleanliness.** Every toilet room and every part thereof, including walls, floors and ceiling, and all fixtures therein, must be kept clean, efficient and in good repair. In

each toilet room sufficient toilet paper must be provided, and it must be made of material which will not obstruct the fixtures in such toilet rooms.

**Order 2206. Existing Toilet Rooms—Walls.** In toilet rooms at present installed, the walls must not be covered with paper. If the walls and ceiling are constructed of wood, they must be covered with a non-absorbent paint.

**Order 2207. Existing Toilet Rooms—Ventilation.** Every toilet room heretofore installed, which is not adequately ventilated by outside windows or skylight, shall be provided with a vent flue of size specified in order 5254, in which a fan shall be placed, if necessary, for proper ventilation.

Every toilet room which cannot be kept sanitary shall be moved so as to be open to outside light and air.

**Order 2210—Partitions Between Fixtures.** Adjoining water-closets or seats of range closets must be separated by partitions not less than 5 feet in height. Each individual urinal or urinal trough must be provided with a partition at each end and at the back to give privacy. Where individual urinals are arranged in batteries, a partition must be placed at each end and at back of the battery.

**Order 2211—Existing Outdoor Toilets.** Existing outdoor toilets will be permitted, until public water and sewer systems are available, if they comply with orders 2200 to 2210, inclusive, and in addition are:

- (1) Completely enclosed and separate from any other building.
- (2) Advantageously located from the standpoint of convenience, privacy and sanitation.
- (3) Located on ground that is well-drained, and where there is no possibility of contaminating any drinking water supply.
- (4) Provided with suitable approach, such as concrete, gravel or cinder walk.
- (5) The vault must be made tight above the ground so that flies, rats and other vermin cannot get into it.
- (6) All windows, ventilators, and other openings must be screened to exclude flies, and all doors must be self-closing.

(7) When the vault is filled to the level of the ground, it must be cleaned out. If a new vault is constructed it must be made in accordance with the requirements for new installations, and the old vault must be properly cleaned, limed and filled with fresh earth.

(8) The entire installation must be kept clean and sanitary. Milk of lime (freshly slaked lime) or other equally effective disinfectant must be used in the vault and in the urinal trough in sufficient quantities and at frequent intervals. The floors, seats, and urinals must be scrubbed as often as necessary.

**Order 2212—When Water and Sewer Become Available.** Within one year after water and sewer systems become available, water-closets, urinals, and lavatories shall be provided.