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GENERAL ORDERS ON
MINES

Effective September 26, 1953

Issued by
INDUSTRIAL COMMISSION OF WISCONSIN
Madison

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GENERAL ORDERS ON MINES

Introduction

The first safety regulations for mines were adopted by the Industrial Commission in 1914 in discharge of its duties under Section 101 of the Statutes of Wisconsin. They applied only to lead and zinc mines. When a qualified mine inspector was added to the staff of the Industrial Commission in 1919, it became apparent that a new code of safety orders was necessary to cover operations in all mines. An advisory committee was organized and their work resulted in the first general code which became effective on May 1, 1922. These orders remained in force until they were reconsidered by another committee whose revised work became effective on October 25, 1937.

The present General Orders on Mines which were adopted by the Industrial Commission on July 24, 1953 are an almost complete revision and rearrangement of the safety regulations for mines which were in effect since October 25, 1937.

This work was done with the advice and assistance of an advisory committee consisting of the following members:

PROF. E. R. SHOREY, University of Wisconsin, Madison; Chairman,

PETER BENSONI, Wisconsin State Industrial Union Council, Gile,

C. F. GUENTHER, Montreal Mining Company, Montreal,

J. A. JOHNSON, U.S. Bureau of Mines, Duluth, Minnesota,

W. A. KNOLL, Pickands Mather & Company, Ironwood, Michigan,

JOSEPH MARINELLO, Wisconsin State Federation of Labor, Milwaukee,

PROF. M. A. MELCHER, Wisconsin Institute of Technology, Platteville,
J. F. MELOY, Meloy & Baker, Benton,
BERNARD PATRITTO, Wisconsin State Industrial Union Council, Hurley,
A. W. USADEL, Wisconsin Industrial Commission, Madison; Secretary

John Lacke, Vinegar Hill Zinc Company, gave the committee valuable assistance as the alternate for Mr. Meloy.

Meetings were held in Madison on June 5 and 6, June 25 and 26, and December 5, 1952. Comments and suggestions received by the committee as the result of public hearings held on the proposed revision in Hurley on October 1 and Platteville on October 10, 1952 were considered and the revised orders were recommended to the Commission for adoption.

The orders were officially published on August 27, 1953 and became effective September 26, 1953.

GENERAL ORDERS ON MINES

Order 300—Scope.

These orders shall apply to all mines operated in the State of Wisconsin.

Order 301—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 302—Definitions.

(a) The term "approved" means approved by the Industrial Commission.

(b) The term "prospect" means any surface or underground opening being driven for the purpose of exploring for and outlining the valuable mineral deposits. It shall not mean the further development of producing mines. A prospect ceases to be such and becomes a "mine" whenever regular sale of its products begins.

(c) The term "mine" means any pit, bank, open cut, or underground opening from which a salable product may be regularly extracted. The term embraces any and all parts of the openings themselves and such mining plants on the surface or underground at or in which any number of persons are engaged in any work contributing to the mining, handling, or recovery of any of the products of the mining operation.

(d) "Mineral" means a product recognized by standard authorities as mineral, whether metalliferous or non-metalliferous. (from Wisconsin Statutes 1951)

(e) "Excavations" or "workings" means any or all parts of a mine excavated or being excavated, including shafts, tunnels, drifts, crosscuts, raises, winzes, stopes, and all other working places in a mine. (from Wisconsin Statutes 1951)

(f) "Shaft" means an opening made for mining minerals, for hoisting and lowering men or material, or for ventilating underground workings. (from Wisconsin Statutes 1951)

(g) The term "underground" means within the limits of any mine excavation beneath the surface of the ground and shall not exclude such excavations as may not be covered by rock or earth.

(h) The term "permissible" means complete equipments having formal approval of the U.S. Bureau of Mines.

(i) The term "person" means a firm or body corporate as well as natural persons.

Order 303—Safety Bulletin Boards.

Safety bulletin boards shall be provided at all mines. All matters pertaining to safety shall be posted on these boards.

Order 304—Care of the Injured, First Aid, and Mine Rescue Requirements.

(a) Approved stretchers with blankets, shall be kept at places convenient and accessible to employees.

(b) An approved supply of first aid material shall be kept and maintained in dust and moisture-proof boxes at various places convenient and readily accessible to employees.

(c) Provision for first aid training of men shall be made each year. Standard U.S. Bureau of Mines instruction shall be given by a competent first aid instructor who has an effective first aid instructor's certificate issued by the U.S. Bureau of Mines.

At least two men on each shift in mines employing from two to fifty men shall be trained within a year.

In mines employing over fifty men, at least 25 per cent of the personnel shall be so trained.

(d) In mining districts in which the Industrial Commission believes fire hazards exist and in which more than fifty men are employed underground, at least fifteen sets of approved two-hour oxygen breathing apparatus shall be maintained to be used in case of emergency. A sufficient supply of oxygen, regenerator charges sufficient to keep all apparatus running for at least ten hours, shall be kept on

hand. An oxygen pump and a sufficient supply of spare parts shall be maintained. This equipment shall be available and in good condition at all times. At least fifteen men thoroughly qualified and physically fit to use approved two-hour oxygen breathing apparatus shall be kept trained and shall practice with the apparatus at least once each month.

(e) Mine conveyances shall be made available immediately whenever any person is so injured as to require attention at the surface.

(f) All injuries, however slight, shall be reported immediately for treatment.

Order 305—Fire Protection and Inspection.

(a) Every reasonable precaution shall be taken against fire in and about mines and fire protection shall be provided as hereafter specified.

(b) Permanent structures over shafts shall be open framework, or buildings lined or sheathed with fire-resistive material such as sheet metal, or asbestos cement sheathing or shingles.

(c) A water supply and at least 1½ inch fire hose with connections shall be provided at or near shaft openings, stations, pump houses, and other places where fire hazards exist. Provision for converting air lines into water lines shall be made in timbered mines. Fire and draft doors shall be installed to control underground air currents in case of fire.

(d) Fire extinguishers of 2½ gallon capacity, or equivalent, protected against freezing, shall be provided and maintained in good condition in readily accessible places in all sections of buildings. Soda-acid extinguishers shall be recharged every year. Vaporizing type fire extinguishers of at least one quart capacity, or equivalent, shall be provided for electrical fire hazards. Carbon tetrachloride extinguishers shall not be used in confined places.

(e) An inspection of all fire apparatus shall be made every three months.

(f) Smoking shall not be permitted in oil houses, or wherever there is flammable material.

(g) Stoves or furnaces used for heating purposes shall be placed on fire-resistive floors projecting at least 2 feet on

all sides. Combustible walls, partitions or ceilings located less than 2 feet from stoves or furnaces shall be protected with at least $\frac{1}{4}$ inch asbestos board covered with galvanized iron.

(h) Combustible materials in roofs, partitions, or sides of buildings shall not be permitted within 18 inches of metal smoke pipes in any shed type mine building. In any other type of building, Orders 5211 and 5212 of the Wisconsin State Building Code shall apply.

(i) Covered metal receptacles shall be provided and maintained for the disposal of oily waste or rags.

(j) A fire alarm system to give warning of a fire to all employees who are working below ground shall be installed and maintained in good working order. In response to such warnings, all persons shall immediately proceed to the surface.

(k) Approved types of containers used for pouring gasoline shall be provided with a closed top, flexible spout, and a safety screen, and no open light shall be permitted within a 10 foot radius during pouring or filling operations.

(l) Neither fire extinguishers nor water shall be used in an attempt to extinguish burning explosives.

(m) Carbide lamps shall not be attached to the harness of animals used in haulage.

(n) Oxyacetylene, oxyhydrogen, or electric welding shall not be started until after protection from fire has been provided. An approved fire extinguisher shall be a part of portable welding unit.

(o) A careful fire inspection shall be made after using oxyacetylene, oxyhydrogen, or electric welding equipment, particularly if the equipment is used in or immediately above a shaft.

Order 306—Flammable Material.

(a) Gasoline, naphtha, distillate, fuel oils, and other dangerous flammable materials shall be stored at least 100 feet away from any shaft or any building directly connected with the shaft opening, except buried tanks which shall be at least 50 feet from such shaft or building.

(b) If oil or gasoline storage places are so located that leakage would permit oil or gasoline to flow in the

direction of the shaft, means to prevent such flow shall be provided.

(c) Not more than one barrel of any one lubricating oil or grease shall be kept in any one place in underground workings.

(d) Gasoline, naphtha, and other distillates shall not be stored in underground workings, except in amount sufficient to operate each fuel-burning locomotive or truck for one shift.

(e) No tank shall be installed from which liquid fuel is to be conducted by gravity to the point of combustion, unless there is installed between such tank and point of combustion a simple, reliable cut-off valve.

(f) Waste or decayed timbers shall not be stored in underground workings except to form a mat or pack; provided, however, that old timbers may remain in place in stopping areas and abandoned workings.

(g) Carbide shall not be stored underground or with explosives.

Order 307—General Safety Orders.

(a) Every reasonable precaution shall be taken to insure the safety of the workmen in or about the mine in all cases whether or not provided for in these orders.

(b) Every workman employed in or about the mine when first engaged shall have his attention directed to the provisions of the General Orders on Mines and other operating rules established by the employer. Each new employee shall be given a copy of the safety rules established by the company.

(c) Winzes or other openings in the floor of mine workings shall be so guarded that persons will not fall into them.

(d) Excavations, pits, banks, or open-cut workings shall be provided with railings or barricades where men are employed in the vicinity, or where passageways, tracks, roadways or buildings adjoin such excavation. Railings shall be not less than 42 inches in height.

(e) All dangerous places shall be fenced off, covered over, or otherwise safeguarded.

(f) No person shall be in solitary employment at a working face unless he is in communication with another employee at least once every thirty minutes.

(g) No men shall be permitted to work alone in an unsafe place unless for the purpose of making it safe, and then only after proper precautions have been taken to protect the men who are doing the work.

(h) At all times when men are working in a mine and flammable buildings are nearer than 100 feet of the mine opening, a man shall be on duty outside the mine.

(i) All shops, storage rooms, passageways and working places, shall be clean and unobstructed. Materials for distribution and use shall be safely piled or stacked.

(j) All defects in or damage to machinery or timbering or to apparatus and equipment generally in and about a mine, and all accidents occurring in the course of mining operations, even though not resulting in personal injury, shall be promptly reported by the person observing them to his immediate superior or someone in authority who shall have the conditions made reasonably safe immediately or exclude all employees from the danger zone.

(k) When working above or below other men, warning shall be given to prevent injury from falling rock or materials.

(l) No person shall remove, damage or carry off any safety device furnished or installed for his protection.

(m) No attempt shall be made to oil the moving parts of any machinery while in motion.

(n) All spikes or nails with points projecting shall be bent down or removed from used lumber in working places or passageways.

(o) Electricity or compressed air shall not be turned on or machinery set in motion without first seeing that persons are not in a position to be injured.

(p) All underground workers and others exposed to the hazard of falling materials shall wear protective hats or caps of approved design and manufacture.

(q) Approved hard-toed boots or shoes shall be used by all underground and surface employees who are exposed to toe injury hazards.

(r) Approved tested and regularly inspected safety belts, harnesses or ropes with approved knots or quick detachable snaps and ample lengths of rope, shall be provided and used by men working in places where there is serious danger of falling.

(s) Eye protection shall be provided and worn by all persons who are exposed to any hazard which may reasonably be expected to cause injury to the eyes.

(t) No persons, while under the influence of intoxicating liquor, shall knowingly be permitted to enter any mine or any of the buildings connected with the operation of the same where men are employed and no one shall carry or use intoxicating liquors in a mine.

Order 308—Shafts.

(a) The tops of shafts and all shaft stations shall be protected by gates, standard guard rails, and toeboards. The gates shall be kept closed at all times, except when loading or unloading.

Note: Standard guard rails are 42 inches in height and consist of top rail, intermediate rail and toeboard.

(b) In shafts where hoisting is being done by means of a bucket, doors shall be provided and used that will prevent any material from falling into a shaft while the bucket is being dumped.

(c) All stations or levels shall have a passageway around the working shaft so that crossing through the hoisting compartment may be avoided.

(d) No person shall enter or cross the hoisting compartment of the shaft except to ascend or descend, or for the purpose of inspecting, or effecting repairs.

(e) Before repairs in a shaft are commenced, the person in charge of or directing repairs shall inform the hoistman of the nature thereof. He shall cause a warning sign to be placed in view of the hoistman.

(f) Staging constructed of sound 3 inch lumber or equivalent protection shall be provided above and below points in shafts at which repairs are being made.

(g) The collars of all regular hoisting shafts and shafts through which men travel shall be lined with reinforced concrete at least 8 inches thick, or equivalent metal support, and secured to bedrock.

(h) The hoisting compartment of shafts in which buckets are used for regular hoisting shall be not less than 6 feet in dimension perpendicular to the long axis of the shaft.

(i) No obstructions shall be permitted in the hoisting compartment of shafts which may interfere with the movements of the hoisting conveyances.

(j) Every shaft shall be wide enough to accommodate a ladder at a safe distance from the ascending or descending skip, bucket, cage, or electric cable.

(k) Manways shall be kept clear of loose rock and obstructions.

(l) No stopping shall be done within 50 feet of a shaft that is used for hoisting men or material.

(m) All abandoned mining shafts, pits, or other abandoned excavations, including abandoned underground workings, shall be covered over, fenced, filled, or otherwise guarded.

Whenever any mine shaft, exploration shaft, or test well is abandoned or its use discontinued, the operator or contractor shall promptly fill same to grade or enclose the same with a fence of strong, woven wire not less than 46 inches high with one barbwire above, or cap same with a reinforced concrete slab at least 6 inches thick or with a native boulder at least three times the diameter of the test well hole, or with a tapered concrete plug. When a fence is used the strands of woven wire shall not be smaller than No. 12 wire and the cross wires and meshes shall not be smaller than No. 16 wire; the strands shall not be more than 12 inches apart, and the meshes shall not exceed 8 inches. All wires shall be tightly stretched and fastened to posts firmly set not more than 8 feet apart.

Note: The provisions of the above paragraph are adopted from Section 340.86 (5) of the Wisconsin Statutes 1951.

Order 309—Ladders and Ladderways.

(a) Every mine shall have at least one means of outlet for underground workers by means of ladders, stairway, or slope, from the lowest workings of the mine to the surface.

(b) All wooden ladders and ladderways shall be built of sound lumber. The stringers shall not be less than nominal 2x4 inches.

(c) The rungs of a ladder shall not be less than 4 inches from the wall upon which the ladder is fastened or any obstruction between the ladder and the wall.

(d) The rungs and treads of every ladder shall be of uniform size and spacing. The spacing shall in no case exceed 12 inches except that for existing ladders a greater spacing will be accepted.

In the case of wooden ladders, rungs shall either extend through the side rails or be bored so as to give at least a 13/16 inch length of bearing to the rung tenon. Cleats shall be inset into the side rails not less than 1/2 inch or shall be attached directly to the edge of the side rails, in which case filler blocks of the thickness of the cleats shall be attached to the edge of the rail for the full length between cleats. Treads shall be inset into the side rails 1/8 inch. Metal rungs shall be bolted, riveted, or welded to the stringers.

Cleat ladders may be spliced with the splice designed to develop the full strength of the stringers. No such ladder shall be longer than 30 feet. Where necessary, extension ladders may be used but in no case shall they be longer than 60 feet.

Ladders constructed of material other than wood may be used if of equivalent strength, but shall not be used where there is a danger of coming in contact with conductors carrying electrical current.

All portable ladders shall be equipped with non-slip bases.

(e) Ladderways in shafts, winzes and raises regularly used as manways, shall have substantial rest platforms at intervals of not more than 25 feet in vertical, and 50 feet in inclined shafts or manways. If possible, the sections of the ladders shall be staggered at each platform so that no section shall be directly in line with the section above or below it. When drill holes not larger than 30 inches are used as escapeways, ladders may be continuous and rest platforms are not required.

(f) The opening in any such platform shall be approximately 21x24 inches or larger, but no openings shall be of such size or dimension as to retard the passing through thereof of rescue men equipped with oxygen breathing apparatus.

(g) Ladders shall project at least 3 feet above every platform in the ladderway and at least 3 feet above the collar of the shaft, winze, or raise, unless convenient and secure handholds are fixed at such places.

(h) All ladders shall be fastened by lashing or by spikes or bolts.

(i) Under no circumstances shall any ladder inclining backward from the vertical be installed or used.

(j) Spare ladders shall be available on each working level.

Order 310—Two Openings to Surface.

(a) All mines shall have at least two exits to the surface, one of which shall be equipped with ladders as specified in Order 309. The additional exits may be serviced by mechanical hoists operated by an independent power source in lieu of ladders. When the exits from the mine are slopes on which men can walk, neither ladders nor hoists are required. An underground travelway connected with a neighboring mine may be considered as one of these exits.

(b) The requirements of Order 310 (a) shall not apply in the case of: (1) Shafts or mines in process of being connected to comply with the terms of this order; (2) Shafts, winzes, raises, tunnels, and drifts to prospect for and develop mineral substances, but not for the extraction of mineral substances except such as may be removed in the course of such development.

(c) When it is impracticable to have two outlets, operation may be allowed with only one outlet under such conditions, and with such precautions as the Industrial Commission may prescribe.

(d) When a shaft mine has only one man outlet, this outlet shall be protected by a fire-resistive door which can be closed in an emergency. This door shall be of 6 inch thick wooden construction or of sheet steel at least $\frac{1}{4}$ inch thick. Access to the surface at least 30 feet from any flammable construction around this outlet shall be provided by an intercepting tunnel or raise.

A slope mine whose surface plant is adjacent to the portal shall be provided with an intercepting opening which is at least 30 feet from any flammable structure.

(e) Routes shall be established through underground workings to exits or outlets and shall be plainly marked with signboards showing the direction to be taken in case of emergency. All new employees shall be instructed as to these routes.

Order 311—Hoisting Equipment.

(a) Each hoist shall have ample power to hoist unbalanced a normal load of men from the lowest point in the shaft.

(b) All hoists used to hoist men shall be equipped with at least two separate and distinct brakes, either of which shall be capable of holding its fully loaded cage, skip or bucket at any point in the shaft. Hoists equipped with friction pulleys shall not be used for any purpose.

(c) The drums of hoists used to hoist men shall be provided with flanges that will extend at least two rope diameters radially beyond the last layer of rope when all of the rope is coiled on the drum.

(d) When hoisting is done in free running buckets, the diameter of the hoist drum and every angle sheave shall be at least 40 rope diameters.

In prospecting operations, a drum at least 18 inches in diameter shall be used.

(e) Such bolts and other fittings of the drums, brakes and clutches as might be a source of danger in the event of their becoming loosened shall be rendered secure by means of suitable locking devices.

(f) Every hoist used to raise or lower men regularly from shafts in cages or skips shall be equipped with an approved automatic controller so designed, installed, and maintained that it will cut off the power and apply the brake in cases of emergency or when the speed limit is exceeded. Automatic controls shall be designed to permit the lowering of the cage or skip by brakes after it has been brought to rest through the failure of the power supply.

(g) When the conveyance is not in plain view of the hoistman throughout the trip, all hoists shall be equipped with indicators or markings to show the position of the conveyance.

(h) Hoisting or lowering a shift of men shall not be permitted unless an iron-bonneted safety cage, skip or bucket is used, but this provision shall not apply to shafts in process of sinking.

(i) When men are being hoisted or lowered in a shaft, at the beginning or end of a shift by means of a bucket, an

emergency sling or an approved attachment shall be used from the cable to the bucket to prevent falling of the conveyance in the event of the breaking of the bail.

(j) All cages in which men are hoisted and lowered in shafts shall be constructed as follows, or in a manner equally safe:

The bonnet shall be of two steel plates 3/16 of an inch in thickness, sloping toward each side, and so arranged that they may be readily pushed upward to afford egress to persons therein. Such bonnet shall cover the top of the cage in such a manner as to protect persons on it from objects falling in the shaft.

(k) Cages shall be provided with sheet iron or steel side casings not less than 1/16 inch thick or less than 5 feet in height, and provided with gates or doors if 50 per cent of the carrying capacity is exceeded. Every open man cage shall be equipped with bars arranged to give every man an easy and secure handhold. Every cage shall be provided with safety catches of sufficient strength to hold the cage with its maximum load at any point in the event the hoisting cable should break.

(l) The safety catches of cages and skips used to hoist men shall be kept well oiled and in good working order. They shall be tested at least once each month by tying up the cage or skip with hemp rope, lowering a few feet of hoisting cable on top of the cage, then cutting the hemp rope, provided that any other system of testing, which is equally effective, may be used.

At least one test each year shall be made in the presence of the mining engineer of the Industrial Commission.

(m) All guides or back runners shall be tested throughout the length of the shaft at least once a month. A supply of guides and back runners of sound lumber shall be on hand.

(n) Every cage or skip used to hoist men shall be designed with a structural factor of safety of ten.

Note: Wherever structural steel or iron is mentioned in these orders, any other metal of equivalent strength may be substituted.

(o) No open hook shall be used with a cage, bucket or skip in hoisting, but some approved form of safety hook or shackle shall be used.

(p) Whims and hand operated windlasses shall be provided with a device to prevent accidental running back of the bucket.

Order 312—Hoisting Practice.

(a) Whenever a shift of men is being hoisted or lowered, a second man familiar with and qualified to stop the hoist shall be on the stand with the hoistman.

(b) No hoistman shall be permitted to work two consecutive shifts.

(c) Safe rates of speed for the cages and skips shall be fixed by the employer and approved by the Industrial Commission for each shaft, and shall not be exceeded in the hoisting or lowering of men.

(d) When hoisting or lowering men with a bucket, the average speed shall not exceed 900 feet per minute.

(e) The maximum number of men that may safely ride on each cage, skip, bucket, or other conveyance used in the mine shall be determined by the employer and approved by the Industrial Commission. There shall be posted a notice at the shaft collar and on the stations at each operating level, stating the maximum number of persons so permitted to ride, and forbidding the carrying of any greater number.

(f) When twenty-five or more men are employed underground on any one shift, and in which men are being hoisted or lowered by cage or other conveyance other than a bucket, such cage or other conveyance shall be operated under the charge of a person appointed as a conductor. No person other than this conductor shall give any signal for the movement of the cage, skip, or conveyance when lowering the shift into the mine or hoisting the shift out of the mine. The conductor shall be given all necessary authority to prevent crowding or scuffling of men in the vicinity of the shaft.

(g) No hoisting of men shall be permitted while ore skips are being hoisted unless the cage compartment is sheathed off from the skip compartment. All hoisting of ore shall stop when more than ten men are being handled on the cage.

(h) Persons shall not get on or off of a cage, skip, or bucket while same is in motion.

(i) No tools or materials shall be transported while the crew is being transported into or from the mine.

(j) Tools, timbers or other materials shall be fastened to the bucket, skip or cage so that their ends will not strike the side of the shaft when they are being raised or lowered.

Order 313—Hoisting Ropes.

(a) No rope for hoisting or lowering men shall be used unless such rope shall be composed of metal wires with a factor of safety determined as hereinafter set forth.

(b) The safety factor of a new rope shall be calculated by dividing the breaking strength of the rope as rated by the manufacturers, by the sum of the maximum load to be hoisted, plus the total weight of the rope in the shaft when fully let out.

(c) Hoisting rope safety factors for various depths of shaft shall continuously conform with the table as given below:

Mine Shafts	Minimum Safety Factor
Up to 500 feet deep.....	8
500 to 1,000 feet deep.....	7
1,000 to 2,000 feet deep.....	6
2,000 to 3,000 feet deep.....	5
Over 3,000 feet deep.....	4

(d) At angle points in incline shafts, the rope shall be supported on rollers or guide pulleys to prevent severe abrasion by rock or track.

(e) No rope shall be used for hoisting:

- (1) When 5 per cent of the wires in the rope are broken in a length equal to eight rope diameters;
- (2) If the wires on the crown are worn to 65 per cent of their original diameter;
- (3) If marked corrosion or dangerous distortion appears.

(f) Each rope used for hoisting or lowering men shall be thoroughly inspected once each week by some competent

person designated for that purpose. It shall be the duty of the employer to properly train any such person designated to inspect all hoisting cables in shafts.

(g) Every rope used for hoisting men shall be fastened at both ends, and when in use shall never be fully unwound; at least three full turns shall remain always on the drum or reel.

(h) The rope shall be attached to the load by the thimble and clip method, the zinc socketing method, or other approved method.

(1) *Thimble and Clip Method.*

(a) The rope shall be attached to the load by passing one end around an oval thimble that is attached to the load and bending the end back so that it is parallel to the long or "live" end of the rope and fastening the two parts of the rope together with clips.

(b) The U-bolt of each clip shall encircle the short or "dead" end of the rope and the distance between clips shall not be less than the figures given in the accompanying table.

Diameter of Rope (Inches)	Number of Clips	Space Between Clips (Inches)
5/8".....	3	3 3/4"
3/4".....	4	4 1/2"
7/8".....	4	5 1/4"
1".....	5	6 "
1 1/8".....	5	7 "
1 1/4".....	5	8 "
1 3/8".....	6	9 "
1 1/2".....	6	10 "
1 5/8".....	6	10 "
1 3/4".....	6	11 "
2".....	8	12 "

(c) When special conditions require the attachment of a sling to the hoisting cable to handle equipment in the shaft, the sling shall be attached by clips in accordance with the table in this order.

(2) *Socketing Method.*

- (a) The work of zinc socketing shall be done by a person experienced in this kind of work.
- (b) Babbit metal or lead shall not be used for socketing wire ropes.

(i) When the thimble and clip method or zinc socketing method is used for fastening the hoisting cable to the load, every cable shall be reclipped or resocketed at frequent intervals or when inspection shows it to be necessary.

(j) Spliced hoisting ropes shall not be used for hoisting in mines.

(k) If, upon any inspection, a hoisting rope shall be found to be below the requirements set forth in this order, it shall be discarded for such purpose forthwith.

(l) A record of the life history, including periodic inspection of all hoisting ropes, shall be kept on file in the mine office.

(m) Each mine shall have available at all times one extra rope for skip and cage.

Note 1: It is recommended that each hoisting rope shall be kept well lubricated at all times.

Note 2: For wire ropes over 1 1/4 inches in diameter it is recommended that the zinc socketing method be used.

Order 314—Hoisting Signal System.

(a) Every operating shaft, if exceeding 50 feet in depth, shall be provided with a means of interchanging distinct and definite signals between the top of the shaft and the lowest level and the various intermediate levels from which hoisting is being done. A signal system shall be installed in all shafts in the process of sinking.

(b) Special care shall be taken to keep the signaling apparatus in good order. Proper precautions shall be taken to prevent electric signal and telephone wires from coming in contact with other electric conductors, whether insulated or not.

(c) A uniform code of signals shall be used in all shafts of any particular mine. An emergency signal shall be part of this code.

An easily legible copy of the signals in use in any mine shall be posted and maintained in the engine or hoisting room, at the collar of the shaft, and at each level or station.

Note: It is recommended that in every shaft that is 300 feet or more in depth, through which hoisting is done, an independent signal line for calling the cage or skip be installed and maintained in good working order.

Order 315—Hoistmen.

(a) Only competent men who are able to speak and read the English language shall be employed to operate mine hoists. Each hoistman shall be given a thorough medical physical examination at least every six months by a competent physician authorized to practice in Wisconsin. The physician shall fill out the examination blank, the form of which is given below, and return it to the employer.

Industrial Commission, Madison, Wisconsin

MEDICAL EXAMINATION FOR HOISTMEN

Name of Applicant _____ Address _____
Employer _____ Town _____ County _____

Record of Past Employment

Employer _____ Address _____ Time Worked _____

Nature of illness causing absence from work during past six months _____

Total years' experience as hoistman _____

Date of last examination, if any _____

Place of birth _____ Date _____

Single _____ Married _____ Living with wife _____

Divorced _____

Are you in good health? _____

Have you ever suffered from defective vision? _____

deafness _____ heart trouble _____

dizzy spells _____ epileptic fits _____

Have you a first aid certificate? _____

year issued _____ by whom _____

I certify that all my answers to the above are correct and true and that I have also read the "Duties of Hoistmen".

Date _____

Signature of Applicant

PHYSICIAN'S REPORT

1. Apparent age..... Weight..... Height.....
Temperature..... Blood Pressure.....
2. Vision: Right eye..... Left eye.....
Color perception
3. Hearing: Right ear..... Left ear.....
4. Nose and throat: Normal.....
Abnormal.....
5. Chest: Expiration
- Inspiration
6. Heart Rhythm..... Size.....
Auscultation..... Pulse.....
7. Abdomen: Scars or hernia.....
8. Spine..... Deformities.....
Rigidity
9. Genito-urinary system
10. Urinalysis
11. Hemorrhoids..... Varicose veins.....
12. Defects of joints, bones or muscles.....
-
13. Does applicant appear to be addicted to stimulants or narcotics?
.....
14. Posture: Excellent..... Good.....
Fair..... Bad.....
15. Reflexes: Patella
- Rhomberg..... Rabinski.....
Coordination
16. Nervous or composed
- Tremors
17. Mental agitation
- Reasons for rejection, if any
-
- Date..... M.D.
- Address.....

(Copies of these forms are available from the Industrial Commission)

Hoistman's Medical Examination

The medical examination of Mr.

leads me to believe he is physically able to assume the duties of a hoistman as of this date.

City..... Date..... M.D.

(b) Hoistmen shall be familiar with the details and workings of a hoisting engine, and, except in cases of emergency, no others than such duly appointed hoistmen shall run such engine or hoisting machinery; except that learners may be taught the operation of the hoisting engine at such times and under such restrictions as may be free of risk to life and limb.

Order 316—Duties of Hoistmen.

The following orders shall be observed by every hoistman.

(1) It shall be the duty of the hoistman to keep a careful watch over his engine, hoisting rope and all other machinery under his charge.

(2) He shall not at any time delegate any of his duties to other persons, except to designated learners or to other qualified hoistmen as directed by the management.

(3) He shall familiarize himself with and use all signal codes for hoisting and lowering as directed to be used in these orders.

(4) He shall not run his engine unless the same is properly provided with efficient brakes, indicators, or distance marks on hoisting ropes or cables, as provided in these orders.

(5) It shall be the duty of the hoistman to exclude every person from his engine room, excepting any person or persons whose duties require their presence therein, and authorized visitors.

(6) He shall hold no conversation with any one while his engine is in motion, or while attending to signals, except to receive orders or instructions in an emergency.

(7) He shall run his engine with extreme caution whenever men are being hoisted or lowered.

(8) He shall not hoist men out of or lower men into any mine or shaft at a speed greater than the established safety rate posted in the engine room.

(9) He shall inspect daily all hoisting machinery and safety appliances and shall report in writing any defects found to the proper authority.

(10) After any stoppage of hoisting for repairs or for any other purpose, exceeding in duration 8 hours, he shall run a bucket, skip, cage, or other conveyance, on which no

men shall ride, except for purposes of inspection, up and down the working part of the shaft at least once. He shall not permit the bucket, skip, cage, or other conveyance to be used for hoisting or lowering men, until the hoisting machinery and shaft shall have been found to be in safe condition. Unless the hoist is in continuous operation, the cage, skip, or bucket shall be lowered to the lowest working level and raised to the surface immediately prior to the beginning of the shift or before men are permitted to be lowered.

(11) He shall not land the bucket, skip, cage, or other conveyance at the collar of the shaft, or at a level, but shall hang the conveyance at least 10 feet above or below the collar of the shaft, or a level before leaving his post.

(12) He shall familiarize himself with and carry out the requirements of all orders pertaining to the discharge of his duties.

(13) Whenever men are working in a place to which they have been lowered by mechanical power, a hoistman or substitute shall remain within hearing of the telephone and signal gongs while the men remain in their working places.

(14) Hoistmen shall not permit the oilers to oil the engine while in motion, and shall exercise every care for the oilers' safety.

(15) When men are working in a shaft without a bulkhead over their heads, and the skip, cage, or bucket is "hung up", neither the hoistman nor any one else, shall move it or knowingly give orders to move it without having received permission to do so from those who are holding it.

(16) When men are working in a shaft without a bulkhead over their heads, the hoistman shall not move the skip, cage, or bucket until he is satisfied that the employees in the shaft have been warned and given time to get in the clear.

(17) No one shall be permitted at any time to tamper with or work on hoisting equipment while men are at work in the shaft.

Copies of these orders shall be given to the hoistman and posted in a conspicuous place in the hoist house.

Order 317—Shaft Sinking and Prospecting.

(a) No cage, skip, or bucket shall be lowered directly to the bottom of the shaft when men are working there. The conveyance shall be stopped at least 15 feet above the bottom and only lowered from that point by a signal from one of the men at the bottom of the shaft.

(b) No other work in any other place in the shaft shall be permitted during shaft sinking operations, nor shall any materials or tools be hoisted or lowered from or to any other place in the shaft while men are at work in the bottom of the shaft.

Exception: Hoisting or work in shafts may be permitted if men in bottom of the shaft are protected by a securely constructed covering, rock pentice, or gallaway stage, extending over the whole area of the shaft and provided with closeable openings for the passage of the men or bucket used in sinking operations.

(c) Fixed ladders shall be provided in all shafts that are in the process of sinking, to within such a distance of the bottom thereof as will secure them from danger by blasting. A chain, wire rope, or wooden extension ladder shall be provided from the end of the fixed ladder to the bottom of the shaft.

Order 318—Trimming and Inspection.

(a) A competent man or men shall be detailed to make daily inspection of those parts of the mine which are traversed or are being worked. He shall inspect the roof, side walls and pillars of those parts of the mine where men are employed and he shall promptly retimber or bar down or cause to be retimbered or barred down in a safe manner any dangerous or questionable ground. Workmen shall stand to one side when barring down or picking loose material.

Before mucking or drilling, and at frequent intervals the ground in working places shall be tested for loose pieces of rock or ore.

Any unsafe condition of the ground which cannot be remedied immediately shall be guarded by a fence or barricade.

Note: Every miner should trim and care for the roof, side walls and pillars of the place where he works.

(b) Inspection of the main shaft and the underground workings for any conditions tending to increase the fire

hazard shall be required once each month. Required second exits and other portions of the mine not regularly frequented shall be inspected for fire hazards and deterioration of ladders or other appliances necessary to maintain an escapeway, upon regular rounds through such places, and in any event at least once each month and a report of the inspection filed in the mine office. If any condition be found in a second exit making it inadequate for an escapeway, repairs shall be commenced immediately and completed with reasonable diligence. A signed report of each inspection shall be kept in the mine office, whether hazardous conditions be found or not.

(c) Approved inspection lights of sufficient intensity shall be provided and maintained for underground inspections of roofs and sidewalls. Ladders or staging shall be available for removing loose ground.

Order 319—Timbering and Timber Supply.

(a) All working places and travel roads shall be, when necessary, kept timbered, barricaded, or otherwise guarded to prevent injury to any person from falling material.

(b) A supply of timbers and other materials necessary to keep working places in a safe condition shall be maintained at all times. Main timber storage areas shall be provided and not more than a two-day supply shall be stored in a working area.

(c) If for any cause, necessary timbers cannot be supplied, work at that place shall cease until timbers are supplied.

Order 320—Ventilation.

(a) All mines shall be ventilated to insure fresh air in all active sections of underground excavations and all inactive sections shall be fenced where concentration limits of paragraph (b) of this order are not complied with.

(b) Noxious gases and insufficiency of oxygen in the air shall not exceed the following limits:

Methane to be less than -----	0.25%
Carbon monoxide to be less than -----	0.01%
Carbon dioxide to be less than -----	0.50%
Oxygen to be more than -----	20.00%
Nitrous fumes to be less than -----	0.001%

If the tests show an excess of these limits for any of the gases, mechanical ventilation shall be provided which will add sufficient air to dilute the gases to comply with the limitations of this table.

(c) Harmful dusts shall be removed from the air breathed by workers, sufficiently to cause the air to be safe to breathe, as defined by Order 2002 of the General Orders on Dusts, Fumes, Vapors, and Gases.

(d) Where fuel-burning locomotives and trucks are used in haulage ways, forced ventilation sufficient to maintain the carbon monoxide contents of the air in haulage ways to .01 per cent or less during period of poorest combustion shall be provided. Fuel-burning locomotives and trucks shall not be allowed to idle when not engaged in hauling.

Order 321—Haulage.

(a) When mechanical haulage is used and a clearance of 30 inches between the farthest projecting edge of moving equipment and the nearest obstruction is not obtainable, safety zones 6 feet deep, measured from outside of car, and 4 feet long, shall be provided at intervals of not more than 100 feet. When the minimum clearance must be less than 20 inches, these safety zones shall be spaced at not more than 50 foot intervals, and if necessary the shelter hole dimensions may be reduced. Under no circumstances shall there be less than 12 inches clearance on either side of the moving equipment.

When truck haulage is used underground, the minimum clearance between truck body and one wall shall be 5 feet and the minimum haulage way width shall be the width of the truck body plus 6 feet. Safety zones shall be provided at 100 foot intervals by covering any drainage ditch or pipe in the haulage way.

Shelter holes shall be kept free of rubbish and shall be painted or otherwise plainly marked. Luminous arrows shall be the minimum requirement for marking.

(b) Employees shall not be allowed to ride on cars, locomotives, and trucks unless authorized to do so. They shall not get on or off the moving vehicle while the same is in motion, nor pass alongside or between cars of a moving train.

(c) Lights and warning signals shall be maintained on both ends of all moving trains. Trucks shall be equipped with head and tail-lights and warning signals.

(d) In all crosscuts and drifts in which men travel, trolley wires shall be boxed or guarded to prevent contact hazards, if they are within 6½ feet of the track elevation. All trolley wires in areas surrounding the loading drifts, man-loading stations, or raises, shall be boxed or guarded without respect to their elevation.

(e) Venturi type blowers shall not be permitted on haulage levels, and whenever noise conditions require special treatment warning systems shall be provided.

(f) A derail, stop block, or other equally effective device shall be provided at the collar of each shaft station to prevent cars from accidentally entering the shaft.

(g) Tracks on the surface shall be kept in good condition and a bumper placed so as to prevent the car from rolling over embankments. A runway for the car men shall be provided.

Order 322—Illumination.

(a) No open flame light shall be left burning unattended on or near flammable materials.

(b) Stationary lights shall be provided during the working hours at all shaft stations, stations on levels where hoisting or haulage is effected by mechanical means, and at night at all places on the surface where work is being conducted.

(c) All places where hoisting, pumping, or other machinery is maintained and in the proximity of which persons are working or moving about shall have a light intensity of not less than 5 foot candles.

(d) The exterior of all underground lamp sockets shall be entirely non-metallic. For flood lamps the supporting shell may be of metal.

(e) Lamp cord, where used for temporary lighting connections, shall have extra heavy insulation. Portable electric hand lamps shall be equipped with a keyless socket of non-combustible, non-absorbent insulating material, large handle of non-absorbent insulating material (such as impregnated wood), and a basket guard.

(f) All incandescent lamps shall be so placed that they cannot come in contact with any combustible material.

(g) Where light wires are supported on insulated supports, rubber covered wire with double braid covering or better shall be used. Separate uncased wires shall be kept at least 3 inches apart, except where they enter the fittings. In case the wires cannot be supported on proper insulators, cables or wires with moisture-proof covering (such as parkway cable or metal-protected, lead-covered cable) shall be used.

(h) Wires which are not armored shall have mechanical protection wherever exposed to injury.

Order 323—Sanitation.

(a) A miner's dry-house shall be provided to dry the working clothes of persons employed in and about the mine. When men must bathe before donning street clothes this dry-house shall comply with Order No. 2214 of the General Orders on Sanitation. In any case, washing facilities as described in this order shall be provided. The dry-house shall be:

- (1) Kept clean and sanitary;
- (2) Provided with at least two exits;
- (3) Well illuminated;
- (4) Provided with clothes lockers or approved hangers;
- (5) Kept well heated, and if necessary, heating equipment shall be guarded against contact hazards. A temperature of not less than 80° F. shall be maintained at all times when men are changing.

Where an operating life of more than two years is anticipated, the dry-house shall meet the minimum ventilation requirements of Orders Nos. 5847 and 5848 of the Heating, Ventilation and Air Conditioning Code.

Dressing rooms, dry-houses, lavatories, and showers shall be cleaned daily of all refuse and kept in a sanitary condition.

(b) Fresh and safe drinking water shall be available to employees during the working hours. Wherever necessary, employers shall pipe water into the mine and provide

drinking fountains. Community drinking vessels shall not be used.

(c) Unless the miners are permitted to use the toilet facilities provided on the surface, within one year from the effective date of these orders, the best system of human waste disposal in mines that can be developed shall be placed in operation in each mine in the state.

(d) Every stable or other place underground used for the housing of mules or horses shall be thoroughly cleaned and the waste contents thereof removed and disposed of at least once in every week or oftener when necessary.

Order 324—Protection Against Water.

(a) No mine working shall be allowed to approach nearer than 30 feet of any part of a winze, stope, or other opening in which there is known or suspected dangerous accumulation of water.

(b) Notice shall be given to the Industrial Commission in writing before starting to advance a mine working toward another mine working that is suspected of being filled with water. A borehole shall be drilled at least 30 feet in advance of the face of the drift when in the vicinity of such mine working filled with water, and also, if necessary in other directions.

(c) Where there is danger of a sudden inburst of water, such additional raises, drifts, or other safety provisions shall be constructed as are necessary in the opinion of the Industrial Commission to insure the escape of workmen.

Order 325—Maps.

A clear and accurate map or maps, with sections, if necessary, showing clearly all the workings of the mine shall be made and maintained. At least twice in every calendar year or oftener, if necessary, all excavations made during the time elapsed since such excavations were last shown on such map or maps, and all parts of said mine that have been worked out or abandoned shall be clearly indicated on the map or maps. All underground workings shall be surveyed and mapped before they are allowed to

become inaccessible. All surveys shall be tied to the legal subdivision.

Before any mine having underground workings is abandoned, the operator of such mine shall cause to be made by a competent engineer or surveyor, a map on a scale not smaller than 100 feet to the inch, showing all underground workings. A certified print or copy of such map shall be filed in the office of the Industrial Commission. This map shall be made available at the discretion of the Industrial Commission to any person whose operations are endangered by the abandoned operation beneath adjoining property.

Order 326—Storage, Transportation and Use of Explosives.

The handling, transportation and storage of explosives shall be governed by the General Orders on Explosives.

General Note

The following publications contain the general orders of the Industrial Commission.

- General Orders on Safety
- General Orders on Explosives
- General Orders on Tunnel, Caisson and Trench Construction
- General Orders on Quarries and Pits
- General Orders on Safety in Construction
- General Orders on Dusts, Fumes, Vapors and Gases
- General Orders on Sanitation
- Boiler Code
- Flammable Liquids Code
- Heating, Ventilation and Air Conditioning Code
- Wisconsin State Electrical Code (obtainable only from Bureau of Purchases, State Capitol, Madison at cost)

Copies of these or other publications applicable to your plant may be obtained free on request from the Industrial Commission with the exception of the electrical code and the building code which are obtainable from the Bureau of Purchases.

APPENDIX

Sections 101.103 and 101.104 of the statutes, relating to requiring notice of beginning of mine operations and to the operation of mines, tunnels, quarries and pits.

101.103 Mine excavations; application; permit. (1) For the purposes of this section:

(a) "Shaft" means an opening made for mining minerals, for hoisting and lowering men or material, or for ventilating underground workings.

(b) "Mineral" means a product recognized by standard authorities as mineral, whether metalliferous or nonmetalliferous.

(c) "Excavation" or "workings" means any or all parts of a mine excavated or being excavated, including shafts, tunnels, drifts, crosscuts, raises, winzes, stopes and all other working places in a mine.

(2) No excavation of a shaft shall be commenced unless a permit is first issued therefor by the Industrial Commission. Permits for such excavation shall be issued without cost upon application filed with the Commission, if the Commission is satisfied that the shaft or the excavation and workings will be in compliance with the safety orders adopted by the Industrial Commission and applicable thereto. Application shall be made upon forms prescribed by the Industrial Commission and shall be furnished upon request.

(3) The provisions of subsection (2) do not apply to shafts which will be less than 50 feet in depth wherein persons are not employed, or which are not equipped with power driven hoists used for hoisting persons in and out of the shafts, or which are not covered with a flammable building.

101.104 Mines, tunnels, quarries, pits; operation in violation of safety aids. If any shaft or workings of a mine, or any tunnel, trench, caisson, quarry, or gravel or sand pit is being operated or used in violation of the safety orders of the Industrial Commission applicable thereto, the owner or operator upon receiving notice of such violation from the Commission shall immediately cease such operation or use. The operation or use of such shaft or workings of a mine, or of such tunnel, trench, caisson, quarry or gravel or sand pit, shall not be resumed until such safety orders have been complied with.