Chapter Comm 7

EXPLOSIVE MATERIALS

Note: Chapter Ind 5 as it existed on April 30, 1985 was repealed and a new chapter ILHR 7 was created effective May 1, 1985. Chapter ILHR 7 was renumbered ch. Comm 7 under s. 13.93 (2m) (b) 1., Stats., and corrections made under s. 13.93 (2m) (b) 6. and 7., Stats., Register, October, 1996, No. 490.

Subchapter I — General Requirements

Comm 7.01 Purpose. Pursuant to s. 101.15 (2) (e), Stats., the purpose of this chapter is to establish minimum safeguards to life, health and property by the adoption of reasonable and effective standards relating to explosive materials in public buildings and at places of employment.

Note: See s. 101.01, Stats., for definitions of "public building" and "place of employment."

Note: The rules pertaining to the licensing of blasters are contained in s. Comm 5.20.

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85; am. Register, October, 1999, No. 526, eff. 11–1–99.

Comm 7.02 Scope. (1) APPLICATION. Except as provided in sub. (2), the provisions of this chapter shall apply to the manufacture, use, storage, handling and intrastate transportation of explosive materials.

(2) EXEMPTIONS. The provisions of this chapter shall not apply to:

(a) Explosive materials while in the course of transportation via railroad, water, highway or air when the explosive materials are moving under the jurisdiction of, and in conformity with, regulations adopted by any federal department or agency;

(b) The laboratories of schools, colleges and similar institutions when confined to the purpose of instruction or research, or to explosive materials in the forms prescribed by the official United States Pharmacopeia or the National Formulary and used in medicines and medicinal agents;

(c) The emergency operations of any government including all departments, agencies and divisions thereof, if they are acting in their official capacity and in the proper performance of their duties or functions;

(d) Pyrotechnics commonly known as fireworks, including signaling devices such as flares and torpedoes;

(e) Small arms ammunition; and

(f) Gasoline, fertilizers and propellant–actuated power devices or tools.

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85.

Comm 7.04 Definitions. The following definitions shall apply in this chapter. Terms not herein defined shall be understood to have their usual and ordinary dictionary meaning.

(1) "Airblast" means an airborne shock wave resulting from the detonation of explosives.

(1m) "Approved" means approval granted by the department.

(2) "Barricade" means natural features of the ground, such as hills, or timber of sufficient density that the surrounding exposures can not be seen when the trees are bare of leaves, or an artificial mound or revetted wall of earth, wood, concrete or other suitable materials.

(2g) "Barrier" means a material object that separates, keeps apart, or demarcates in a conspicuous manner such as cones, a warning sign, or tape.

(2k) "Blast area" means the area of a blast within the influence of flying rock missiles, gases, and concussion as determined by the blaster in charge.

(2p) "Blast site" means the area where explosive material is handled during loading of blastholes, including 50 feet in all directions from the perimeter formed by the loaded holes. A minimum of 30 feet may replace the 50 feet requirement if the perimeter of loaded holes is marked and separated from non–blast site areas by a barrier. The 50 feet or 30 feet distance requirements, as applicable, apply in all directions along the full depth of the

blasthole. In underground mines, at least 15 feet of a solid rib, pillar, or broken rock may be substituted for the 50 foot distance.

(3) "Blaster" means any individual holding a valid blaster's license issued by the department.

(3m) "Blaster in charge" means that qualified person in charge of, and responsible for, the loading and firing of a blast.

(4) "Blasting" means any method of loosening, moving or shattering masses of solid matter by use of an explosive.

(5) "Blasting agent" means any explosive material or mixture, consisting of a fuel and oxidizer, intended for blasting, not otherwise classified as an explosive, if the material or mixture cannot be detonated by a No. 8 test detonator when unconfined.

(7) "Blasting mat" means a heavy mat of woven rope, steel wire, or chain, or a mat improvised from timber, poles, rubber tires or other approved materials, placed over loaded holes to minimize the amount of rock and other debris that might be thrown into the air.

(8) "Blasting operation" means any operation, enterprise or activity involving the use of blasting.

(8m) "Blasting resultants" means the physical manifestations of forces released by blasting, including but not limited to projectile matter, vibration and concussion, which might cause injury, damage or unreasonable annoyance to persons or property located outside the controlled blasting site area.

(10) "Community" means a city, village or inhabited area of a town.

(10m) "Controlled blasting site area" means the area that surrounds a blast site and:

(a) Is owned by the operator; or

(b) With respect to which, because of property ownership, an employment relationship or an agreement with the property owner, the operator can take reasonably adequate measures to exclude or to assure the safety of persons and property.

(11) "Crosscut" means a small passageway driven at right angles to the main entry to connect it with a parallel entry or air course.

(11m) "Deck" means an explosive charge that is separated from other charges in the blast hole by stemming or an air cushion.

(12) "Delay electric detonator" means an electric detonator with a timing element interposed between the ignition head and the detonating compound.

(13) "Department" means the department of commerce.

(14) "Detonator" means any device containing a detonating charge that is used for initiating detonation in an explosive. The term includes, but is not limited to, electric detonators of instantaneous and delay types, fuse caps for use with safety fuses, detonating cord delay connectors, and non–electric instantaneous and delay detonators.

(14m) Detonator–sensitive explosive material" means any explosive material that can be detonated by means of a No. 8 test detonator when unconfined.

(15) "Drift" means a horizontal passage underground which follows the vein, as distinguished from a crosscut, which intersects it.

(16) "Electric detonator" means a detonator designed for, and capable of, initiation by means of an electric current.

(17) "Explosion" means the substantially instantaneous release of both gas and heat.

(18) "Explosive" means any chemical compound, mixture or device, the primary or common purpose of which is to function by explosion unless the compound, mixture or device is otherwise classified by the department by rule.

(19) "Explosive materials" means explosives, blasting agents and detonators. The term includes, but is not limited to, dynamite and other high explosives, slurries, emulsions, water gels, blasting agents, black powder, pellet powder, initiating explosives, detonators, safety fuses, squibs, detonating cord, igniter cord and igniters.

(19h) "Flyrock" means rock that is propelled through the air from a blast.

(19m) "Fuse cap" means a detonator that is initiated by a safety fuse.

(19r) "Ground vibration" means a shaking of the ground caused by the elastic wave emanating from a blast.

(20) "High explosives" means explosive materials which are characterized by a very high rate of reaction, high pressure development, and the presence of a detonation wave in the explosion.

(21) "Highway" means any public street, public alley or public road.

(21m) "Inhabited area" means an area where the inhabitant or inhabited building is subject to blasting resultants.

(22) "Inhabited building" means a building regularly occupied in whole or in part as a habitation for human beings, or any church, schoolhouse, railroad station, store or other structure where people are accustomed to assemble, except any building or structure occupied in connection with the manufacture, transportation, storage or use of explosive materials.

(23) "Low explosives" means explosive materials which are characterized by deflagration or a low rate of reaction and the development of low pressures. The term includes, but is not limited to black powder, safety fuses, igniters, igniter cords and fuse lighters.

(24) "Magazine" means any building, container or structure other than an explosives manufacturing building, of approved construction used for the storage of explosive materials.

(25) "No. 8 test detonator" means a detonator with 0.40 to 0.45 grams pentaerythritol tetranitrate (PETN) base charge pressed to a specific gravity of 1.4 grams/cubic centimeter (g/cc) and primed with standard weights of primer.

(26) "Non–electric delay detonator" means a non–electric detonator with an integral delay element used in conjunction with, and capable of being initiated by, a detonating impulse.

(26h) "Non–electric detonator" means a detonator that does not require the use of electric energy to function.

(27) "Operator" means the person who is responsible for the operation at a mine, pit, quarry, or construction site where blasting activity occurs.

(27m) "Particle velocity" means any measure of ground vibration describing the velocity at which a particle of ground vibrates when excited by a seismic wave.

(28) "Person" means any individual, corporation, company, association, firm, partnership, society or joint stock company.

(28m) "Powder factor" means any ratio between the amount of powder loaded and the amount of rock broken.

(29) "Primer" means a unit, package or cartridge of explosives used to initiate other explosives or blasting agents, and which contains a detonator or a detonating cord to which is attached a detonator designed to initiate the detonating cord.

(30) "Railway" means any steam, electric, diesel–electric or other rail track system which carries passengers for hire.

(31) "Stemming" means the inert material, such as drill cuttings, used in the collar portion or elsewhere of a blast hole to confine the gaseous products of detonation.

(32) "Unreasonable annoyance" means an excessive, repeated noise, action or other disturbance that is not justified by reason.

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85; renum. (1) to be (1m), cr. (intro.), (1), (8m), (10m), (19h), (19r), (27m), (28m) and (32), Register, May, 1987, No. 377, eff. 6–1–87; am. (10), cr. (21m), Register, September, 1994, No. 465, eff. 10–1–94; am. (2), (10m) (intro.), (12), (14), (16), (26), cr. (2g), (2k), (2p), (3m), (11m), (19m), (26h), r. (6), renum. and am. (9) to be (14m), r. and recr. (27) and (29), Register, October, 1999, No. 526, eff. 11–1–99.

Comm 7.05 Inspections. (1) GENERAL REQUIREMENTS. The authorized inspectors of the department, upon presenting appropriate credentials to the owner, operator or agent in charge, may:

(a) Enter without delay and at reasonable times any factory, plant, establishment, construction site or other area, workplace or environment where work is performed by an employee of an employer; and

(b) Inspect and investigate during regular working hours and at other reasonable times, and within reasonable limits and in a reasonable manner, any place of employment and all pertinent conditions, structures, machines, apparatus, devices, equipment and materials therein, and to question privately any employer, owner, operator, agent or employee.

(2) REPRESENTATION. The inspector, before making an inspection, shall contact the employer or employer's representative who shall be given an opportunity to accompany the inspector during the physical inspection of any workplace under sub. (1).

Note: The department policy is not to give advance notice, but in the scheduling and in the act of inspecting it may not always be possible to avoid advance notice or to obtain accompaniment, but otherwise these rules will be diligently observed.

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85.

Comm 7.06 Fees. Fees for safety inspections and petitions for variance shall be submitted as specified in ch. Comm 2.

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85; am. Register, September, 1994, No. 465, eff. 10–1–94; am. Register, October, 1996, No. 490, eff. 11–1–96.

Comm 7.07 Enforcement. The provisions of this chapter shall be enforced by the department, or by municipal officials or other local officials who are required by law to enforce the administrative rules of the department.

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85.

Comm 7.08 Appeals. (1) APPEAL OF LOCAL ORDER. Any person affected by a local order which may be in conflict with a rule of the department may petition the department for a hearing on the grounds that the local order is unreasonable and in conflict with the rule of the department.

Note: Section 101.01 (8), Stats., defines "local order" as any ordinance, order, rule or determination of any common council, board of alderpersons, board of trustees or the village board, of any village or city, or the board of health of any municipality, or an order or direction of any official of such municipality, upon any matter over which the department has jurisdiction.

(2) PETITION OF ADMINISTRATIVE RULE. Pursuant to s. 227.12, Stats., any municipality, corporation or any 5 or more persons having an interest in an administrative rule may petition the department requesting the adoption, amendment or repeal of the rule.

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85; correction in (2) made under s. 13.93 (2m) (b) 7., Stats., Register, September, 1994, No. 465.

Comm 7.09 Petition for variance. The department shall consider and may grant a variance to a provision of this chapter in accordance with ch. Comm 3. The petition for variance shall include, where applicable, a position statement from the fire department having jurisdiction.

Note: Chapter Comm 3 requires the submittal of a petition for variance form (SBD–9890) and a fee, and that an equivalency is established in the petition for variance that meets the intent of the rule being petitioned. Chapter Comm 3 also requires the department to process regular petitions within 30 business days and priority petitions within 10 business days.

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85; r. and recr., Register, October, 1999, No. 526, eff. 11–1–99.

Comm 7.10 Penalties. Penalties for violation of any provision in this chapter shall be assessed in accordance with s. 101.02 (12) and (13), Stats.

Note: Section 101.02 (13) (a), Stats., indicates penalties will be assessed against any employer, employee, owner or other person who fails or refuses to perform any duty lawfully enjoined, within the time prescribed by the department, for which no penalty has been specifically provided, or who fails, neglects or refuses to comply with any lawful order made by the department, or any judgment or decree made by any court in connection with ss. 101.01 to 101.25, Stats. For each such violation, failure or refusal, such employee, owner or other person must forfeit and pay into the state treasury a sum not less than $10 nor more than $100 for each violation.

Note: Section 101.02 (12), Stats., indicates that every day during which any person, persons, corporation or any officer, agent or employee thereof, fails to observe and comply with an order of the department will constitute a separate and distinct violation of such order.

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85.

Comm 7.12 Recordkeeping, reporting and dealer operations. (1) PERMITTED SALES. (a) Except as provided in par. (b), a person engaged in the business of dealing in explosive materials may sell, give, deliver or transfer only to persons holding a valid Wisconsin blaster's license or authorized agents of concerns employing licensed blasters.

(b) Black powder and smokeless propellants, for sportsmen's use may be purchased by persons not possessing a Wisconsin blaster's license.

(2) SALES RECORDS. (a) Explosive materials dealers shall keep a record of all sales involving explosive materials for 5 years. The records shall be made available to the department upon request.

(b) Invoices, sales slips, delivery tickets, receipts or similar papers representing individual transactions shall satisfy the requirements for records provided they include the signature of any receiver of the explosive materials.

(c) Records made and kept for compliance with regulations of the federal bureau of alcohol, tobacco and firearms need not be duplicated to satisfy the requirements of this subsection.

(3) REPORTING THEFT OR LOSS. The theft or loss of explosive materials shall be reported to the local law enforcement agency.

Note: The federal bureau of alcohol, tobacco and firearms requires reporting the theft or loss of any explosive materials within 24 hours by telephoning 1–800–424–9555.

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85.

Comm 7.13 Notification of injury or violation. The blaster in charge of the blasting operation shall notify the department within 2 business days of occurrence of any blast resulting in bodily injury, death or violation of the blasting resultant limits specified in s. Comm 7.64.

Note: The department can be notified at the Division of Safety and Buildings, P.O. Box 7969, Madison, Wisconsin 53707, telephone 608/266–3151 during normal business hours.

History: Cr. Register, September, 1994, No. 465, eff. 10–1–94; correction made under s. 13.93 (2m) (b) 7., Stats., Register, October, 1996, No. 490.

Subchapter II — Storage of Explosive Materials

Note: Sections Comm 7.203 to 7.22 follow the storage requirements of subpart K of the federal bureau of alcohol, tobacco and firearms. Section numbering corresponds with that used in Title 27 CFR Part 55.

Comm 7.20 General storage requirements. (1) NOTIFICATION. Any person storing explosive materials shall notify the local fire department and local law enforcement agency within 24 hours of the initial place, extent and manner of the storage, and of any subsequent changes in the location of that storage. Notification shall be made on forms provided by the department.

Note: Copies of the notice of storage of explosive materials (form SBD–6772) are available at no charge from the Safety and Buildings Division, P.O. Box 7302, Madison, WI 53707, telephone 608/266–8577. A list of state fire departments is available at a cost from the Safety and Buildings Division, P.O. Box 2509, Madison, WI 53701, telephone 608/267–4405.

Note: The state Division of Emergency Management requires reporting of hazardous chemicals under chs. WEM 1 to 6.

(3) MAGAZINE RESPONSIBILITY. Magazines shall be under the responsibility of a person at least 21 years of age and specifically appointed for the purpose. This person shall have possession of the keys of the magazine and shall be responsible for the safe storage of explosives contained in the magazine.

(4) SIGNS. Signs with the words EXPLOSIVES – KEEP OFF legibly printed in contrasting colors and in letters at least 3 inches in height and $^1/_4$ inch in stroke, shall be posted and maintained at all times on the premises on which the magazines are located.

Except for Type 3 magazines, the signs shall be located so that a bullet fired directly at them will not strike any magazine.

(5) INDOOR MAGAZINE LOCATIONS. Indoor magazines shall be located on the floor nearest the ground level, within 10 feet from an outside entrance, and at least 10 feet from another magazine.

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85; am. (1), r. (2), Register, October, 1999, No. 526, eff. 11–1–99.

Comm 7.203 Types of magazines. For the purposes of this chapter, there are 5 types of magazines. These types, together with the classes of explosive materials which may be stored in them, shall be as specified in subs. (1) to (5).

(1) TYPE 1 MAGAZINES. Type 1 magazines shall be permanent magazines for the storage of high explosives, subject to the limitations prescribed by ss. Comm 7.206 and 7.213. Other classes of explosive materials may also be stored in Type 1 magazines.

(2) TYPE 2 MAGAZINES. Type 2 magazines shall be mobile and portable indoor and outdoor magazines for the storage of high explosives, subject to the limitations prescribed by ss. Comm 7.206, 7.208 (2) and 7.213. Other classes of explosive materials may also be stored in Type 2 magazines.

(3) TYPE 3 MAGAZINES. Type 3 magazines shall be portable outdoor magazines for the temporary storage of high explosives while attended, subject to the limitations prescribed by ss. Comm 7.206 and 7.213. Other classes of explosive materials may also be stored in Type 3 magazines.

Note: An example of a Type 3 magazine is a "day–box".

(4) TYPE 4 MAGAZINES. Type 4 magazines shall be magazines for the storage of low explosives, subject to the limitations prescribed by ss. Comm 7.206 (2), 7.21 (2) and 7.213. Blasting agents may be stored in Type 4 magazines, subject to the limitations prescribed by ss. Comm 7.206 (3), 7.211 (2) and 7.213. Detonators that will not mass detonate may also be stored in Type 4 magazines, subject to the limitations prescribed by ss. Comm 7.206 (1), 7.21 (2) and 7.213.

(5) TYPE 5 MAGAZINES. Type 5 magazines shall be magazines for the storage of blasting agents, subject to the limitations prescribed by ss. Comm 7.206 (3), 7.211 (2) and 7.213.

Note: Complete plans for all types of magazines are available from the U.S. bureau of mines, explosive manufacturers, and the institute of makers of explosives.

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85; corrections made under s. 13.93 (2m) (b) 7., Stats., Register, October, 1996, No. 490.

Comm 7.204 Inspection of magazines. Any person storing explosive materials shall inspect their magazines at least every 7 calendar days. This inspection need not be an inventory, but shall be sufficient to determine whether there has been unauthorized entry or attempted entry into the magazines, or unauthorized removal of the contents of the magazines.

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85.

Comm 7.205 Movement of explosive materials. All explosive materials shall be kept in locked magazines meeting the requirements in this chapter unless the materials are in the process of manufacture; being physically handled in the operating process of a licensee or user; being used; or being transported to a place of storage or use by a licensee or permittee or by a person who has lawfully acquired explosive materials.

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85.

Comm 7.206 Location of magazines. (1) HIGH EXPLOSIVES STORAGE. Outdoor magazines in which high explosives are stored shall be located no closer to inhabited buildings, passenger railways, public highways, or other magazines in which high explosives are stored, than the minimum distances specified in the table of distances for storage of explosive materials in s. Comm 7.218.

(2) LOW EXPLOSIVES STORAGE. Outdoor magazines in which low explosives are stored shall be located no closer to inhabited buildings, passenger railways, public highways, or other magazines in which explosive materials are stored, than the minimum distances specified in the table of distances for storage of low explosives in s. Comm 7.219. The distances shown in s. Comm 7.219 shall not be reduced by the presence of barricades.

(3) BLASTING AGENTS STORAGE. (a) Outdoor magazines in which blasting agents in quantities of more than 50 pounds are stored shall be located no closer to inhabited buildings, passenger railways, or public highways than the minimum distances specified in the table of distances for storage of explosive materials in s. Comm 7.218.

(b) Ammonium nitrate and magazines in which blasting agents are stored shall be located no closer to magazines in which high explosives or other blasting agents are stored than the minimum distances specified in the table of distances for the separation of ammonium nitrate and blasting agents in s. Comm 7.22. However, the minimum distances for magazines in which explosives and blasting agents are stored from inhabited buildings, passenger railways, or public highways, shall not be less than the distances specified in the table of distances for storage of explosive materials in s. Comm 7.218.

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85; corrections made under s. 13.93 (2m) (b) 7., Stats., Register, October, 1996, No. 490.

Comm 7.207 Construction of Type 1 magazines. A Type 1 magazine is a permanent structure, such as but not limited to, a building, an igloo or"Army–type structure", a tunnel, or a dugout. It shall be bullet–resistant, fire–resistant, weather–resistant, theft–resistant and ventilated.

(1) BUILDINGS. All Type 1 building magazines shall be constructed of masonry, wood, metal or a combination of these materials, and have no openings except for entrances and ventilation. The ground around building magazines shall slope away for drainage or other adequate drainage shall be provided. The construction of Type 1 building magazines shall comply with the requirements of pars. (a) to (k).

(a) *Masonry wall construction.* Masonry wall construction shall consist of brick, concrete, tile, cement block, or cinder block and be not less than 6 inches in thickness. Hollow masonry units used in construction shall have all hollow spaces filled with well–tamped, coarse, dry sand or weak concrete consisting of at least a mixture of one part cement and 8 parts of sand with enough water to dampen the mixture while tamping in place. Interior walls shall be constructed of, or covered with, a nonsparking material.

(b) *Fabricated metal wall construction.* Metal wall construction shall consist of sectional sheets of steel or aluminum not less than number 14–gauge, securely fastened to a metal framework. Metal wall construction shall be either lined inside with brick, solid cement blocks or hardwood not less than 4 inches thick, or shall have at least a 6 inch sand fill between interior and exterior walls. Interior walls shall be constructed of, or covered with, a nonsparking material.

(c) *Wood frame wall construction.* The exterior of outer wood walls shall be covered with iron or aluminum not less than number 26–gauge. An inner wall of, or covered with, nonsparking material shall be constructed so as to provide a space of not less than 6 inches between the outer and inner walls. The space shall be filled with coarse, dry sand or weak concrete.

(d) *Floors.* Floors shall be constructed of, or covered with, a nonsparking material and shall be strong enough to bear the weight of the maximum quantity to be stored. Use of pallets covered with a nonsparking material is considered equivalent to a floor constructed of or covered with a nonsparking material.

(e) *Foundations.* Foundations shall be constructed of brick, concrete, cement block, stone, or wood posts. If piers or posts are used, in lieu of a continuous foundation, the space under the buildings shall be enclosed with not less than 26–gauge metal.

(f) *Roof.* Except for buildings with fabricated metal roofs, the outer roof shall be covered with no less than number 26–gauge iron or aluminum, fastened to at least $^{7}/_{8}$ inch sheathing.

(g) *Bullet−resistant ceilings or roofs.* Where it is possible for a bullet to be fired directly through the roof and into the magazine at such an angle that the bullet would strike the explosives within, the magazine shall be protected by one of the following methods:

1. A sand tray lined with a layer of building paper, plastic, or other nonporous material, and filled with not less than 4 inches of coarse, dry sand and located at the tops of inner walls covering the entire ceiling area, except that portion necessary for ventilation.

2. A fabricated metal roof constructed of $^3/_{16}$ inch plate steel lined with 4 inches of hardwood. For each additional $^1/_{16}$ inch of plate steel, the hardwood lining may be decreased one inch.

(h) *Doors.* All doors shall be constructed of not less than $^1/_4$ inch plate steel and lined with at least 2 inches of hardwood. Hinges and hasps shall be attached to the doors by welding, riveting, or bolting with nuts on the inside of the door. Hinges and hasps shall be installed in such a manner that they cannot be removed when the doors are closed and locked.

(i) *Locks.* Each door shall be equipped with 2 mortise locks; 2 padlocks fastened in separate hasps and staples; a combination of a mortise lock and padlock; a mortise lock that requires 2 keys to open; or a three−point lock. Padlocks shall have at least 5 tumblers and a casehardened shackle of at least $^3/_8$ inch diameter. Padlocks shall be protected with not less than $^1/_4$ inch steel hoods constructed so as to prevent sawing or lever action on the locks, hasps and staples. These requirements do not apply to magazine doors that are adequately secured on the inside by means of a bolt, lock or bar that cannot be actuated from the outside.

(j) *Ventilation.* Ventilation shall be provided to prevent dampness and heating of stored explosive materials. Ventilation openings shall be screened to prevent the entrance of sparks. Ventilation openings in side walls and foundations shall be offset or shielded for bullet−resistant purposes. Magazines having foundation and roof ventilators with the air circulating between the side walls and the floors and between the side walls and the ceiling shall have a wooden lattice lining or equivalent to prevent the packages of explosive materials from being stacked against the side walls and blocking the air circulation.

(k) *Exposed metal.* No sparking material may be exposed to contact with the stored explosive materials. All ferrous metal nails in the floor and side walls, which might be exposed to contact with explosive materials, shall be blind nailed, countersunk, or covered with a nonsparking lattice work or other nonsparking material.

(2) IGLOOS, "ARMY−TYPE STRUCTURES", TUNNELS AND DUGOUTS. All Type 1 igloo,"Army−type structure", tunnel and dugout magazines shall be constructed of reinforced concrete, masonry, metal, or a combination of these materials. They shall have an earthmound covering of not less than 24 inches on the top, sides and rear unless the magazine meets the requirements of sub. (1) (g). Interior walls and floors shall be constructed of, or covered with, a nonsparking material. Magazines of this type shall also be constructed in conformity with the requirements of subs. (1) (d) and (1) (h) to (k).

History: Cr. Register, April, 1985, No. 352, eff. 5−1−85.

Comm 7.208 Construction of Type 2 magazines. A Type 2 magazine is a box, trailer, semi−trailer, or other mobile facility.

(1) OUTDOOR MAGAZINES. (a) *General.* Outdoor Type 2 magazines shall be bullet−resistant, fire−resistant, weather−resistant, theft−resistant and ventilated. They shall be supported to prevent direct contact with the ground and, if less than one cubic yard in size, shall be securely fastened to a fixed object. The ground around outdoor magazines shall slope away for drainage or other adequate drainage shall be provided. When unattended, vehicular magazines shall have wheels removed or otherwise effectively immobilized by kingpin locking devices or other methods approved by the department. The construction of outdoor Type 2 magazines shall comply with the requirements of pars. (b) to (d).

(b) *Exterior construction.* The exterior and doors shall be constructed of not less than $^1/_4$ inch steel and lined with at least 2 inches of hardwood. Magazines with top openings shall have lids with water−resistant seals or which overlap the sides by at least one inch when in a closed position.

(c) *Hinges and hasps.* Hinges and hasps shall be attached to doors by welding, riveting, or bolting with nuts on the inside of the door. Hinges and hasps shall be installed so that they cannot be removed when the doors are closed and locked.

(d) *Locks.* Each door shall be equipped with 2 mortise locks; 2 padlocks fastened in separate hasps and staples; a combination of a mortise lock and a padlock; a mortise lock that requires 2 keys to open; or a three−point lock. Padlocks shall have at least 5 tumblers and a case−hardened shackle of at least $^3/_8$ inch diameter. Padlocks shall be protected with not less than $^1/_4$ inch steel hoods constructed so as to prevent sawing or lever action on the locks, hasps and staples. These requirements do not apply to magazine doors that are adequately secured on the inside by means of a bolt, lock or bar that cannot be actuated from the outside.

(2) INDOOR MAGAZINES. (a) *General.* Indoor Type 2 magazines shall be fire−resistant and theft−resistant. They need not be bullet−resistant and weather−resistant if the buildings in which they are stored provide protection from the weather and from bullet penetration. No indoor magazine may be located in a residence or dwelling. The indoor storage of high explosives shall not exceed a quantity of 50 pounds. More than one indoor magazine may be located in the same building if the total quantity of explosive materials stored does not exceed 50 pounds. Except as provided in s. Comm 7.213, detonators shall be stored in a separate magazine and the total quantity of detonators shall not exceed 5,000. The construction of indoor Type 2 magazines shall comply with the requirements of pars. (b) to (d).

(b) *Exterior construction.* Indoor Type 2 magazines shall be constructed of wood or metal according to one of the following specifications:

1. Wood indoor magazines shall have sides, bottoms and doors constructed of at least 2 inches of hardwood and shall be well braced at the corners. They shall be covered with sheet metal of not less than number 26−gauge. Nails exposed to the interior of magazines shall be countersunk.

2. Metal indoor magazines shall have sides, bottoms and doors constructed of not less than number 12−gauge metal and shall be lined inside with a nonsparking material. Edges of metal covers shall overlap sides at least one inch.

(c) *Hinges and hasps.* Hinges and hasps shall be attached to doors by welding, riveting, or bolting with nuts on the inside of the door. Hinges and hasps shall be installed so that they cannot be removed when the doors are closed and locked.

(d) *Locks.* Each door shall be equipped with 2 mortise locks; 2 padlocks fastened in separate hasps and staples; a combination of a mortise lock and a padlock; a mortise lock that requires 2 keys to open; or a three−point lock. Padlocks shall have at least 5 tumblers and a case−hardened shackle of at least $^3/_8$ inch diameter. Padlocks shall be protected with not less than $^1/_4$ inch steel hoods constructed so as to prevent sawing or lever action on the locks, hasps and staples. Indoor magazines located in secure rooms that are locked as provided in this paragraph may have each door locked with one steel padlock, which need not be protected by a steel hood, having at least 5 tumblers and a case−hardened shackle of at least $^3/_8$ inch diameter, if the door hinges and lock hasp are securely fastened to the magazine. These requirements do not apply to magazine doors that are adequately secured on the inside by means of a bolt, lock or bar that cannot be actuated from the outside.

(3) DETONATOR BOXES. Magazines for detonators in quantities of 100 or less shall have sides, bottoms and doors constructed of not less than number 12–gauge metal and lined with a nonsparking material. Hinges and hasps shall be attached so they cannot be removed from the outside. One steel padlock, which need not be protected by a steel hood, having at least 5 tumblers and a case–hardened shackle of at least $^3/_8$ inch diameter shall be sufficient for locking purposes.

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85.

Comm 7.209 Construction of Type 3 magazines. A Type 3 magazine is a"day–box" or other portable magazine. It shall be fire–resistant, weather–resistant and theft–resistant. A Type 3 magazine shall be constructed of not less than number 12–gauge steel, lined with at least either $^1/_2$ inch plywood or $^1/_2$ inch Masonite–type hardboard. Doors shall overlap sides by at least one inch. Hinges and hasps shall be attached by welding, riveting, or bolting with nuts on the inside. One steel padlock, which need not be protected by a steel hood, having at least 5 tumblers and a case–hardened shackle of at least $^3/_8$ inch diameter is sufficient for locking purposes. Explosive materials shall not be left unattended in Type 3 magazines and shall be removed to Type 1 or 2 magazines for unattended storage.

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85.

Comm 7.21 Construction of Type 4 magazines. A Type 4 magazine is a building, igloo or "Army–type structure", tunnel, dugout, box, trailer, or a semitrailer or other mobile facility.

(1) OUTDOOR MAGAZINES. (a) *General.* Outdoor Type 4 magazines shall be fire–resistant, weather–resistant, and theft–resistant. The ground around outdoor magazines shall slope away for drainage or other adequate drainage shall be provided. When unattended, vehicular magazines shall have wheels removed or otherwise be effectively immobilized by kingpin locking devices or other methods approved by the department. The construction of outdoor Type 4 magazines shall comply with the requirements of pars. (b) to (d).

(b) *Construction.* Outdoor Type 4 magazines shall be constructed of masonry, metal–covered wood, fabricated metal, or a combination of these materials. Foundations shall be constructed of brick, concrete, cement block, stone, or metal or wood posts. If piers or posts are used, in lieu of a continuous foundation, the space under the building shall be enclosed with fire–resistant material. The walls and floors shall be constructed of, or covered with, a nonsparking material or lattice work. The doors shall be metal or solid wood covered with metal.

(c) *Hinges and hasps.* Hinges and hasps shall be attached to doors by welding, riveting, or bolting with nuts on the inside of the door. Hinges and hasps shall be installed so that they cannot be removed when the doors are closed and locked.

(d) *Locks.* Each door shall be equipped with 2 mortise locks; 2 padlocks fastened in separate hasps and staples; a combination of a mortise lock and a padlock; a mortise lock that requires 2 keys to open; or a three–point lock. Padlocks shall have at least 5 tumblers and a case–hardened shackle of at least $^3/_8$ inch diameter. Padlocks shall be protected with not less than $^1/_4$ inch steel hoods constructed so as to prevent sawing or lever action on the locks, hasps and staples. These requirements do not apply to magazine doors that are adequately secured on the inside by means of a bolt, lock or bar that cannot be actuated from the outside.

(2) INDOOR MAGAZINES. (a) *General.* Indoor Type 4 magazines shall be fire–resistant and theft–resistant. They need not be weather–resistant if the buildings in which they are stored provide protection from the weather. No indoor magazine may be located in a residence or dwelling. The indoor storage of low explosives shall not exceed a quantity of 50 pounds. More than one indoor magazine may be located in the same building if the total quantity of explosive materials stored does not exceed 50 pounds. Detonators that will not mass detonate shall be stored in a separate magazine and the total number of electric detonators shall not exceed 5,000. The construction of indoor Type 4 magazines shall comply with the requirements of pars. (b) to (d).

(b) *Construction.* Indoor Type 4 magazines shall be constructed of masonry, metal–covered wood, fabricated metal, or a combination of these materials. The walls and floors shall be constructed of, or covered with, a nonsparking material. The doors shall be metal or solid wood covered with metal.

(c) *Hinges and hasps.* Hinges and hasps shall be attached to doors by welding, riveting, or bolting with nuts on the inside of the door. Hinges and hasps shall be installed so that they cannot be removed when the doors are closed and locked.

(d) *Locks.* Each door shall be equipped with 2 mortise locks; 2 padlocks fastened in separate hasps and staples; a combination of a mortise lock and padlock; a mortise lock that requires 2 keys to open; or a three–point lock. Padlocks shall have at least 5 tumblers and a case–hardened shackle of at least $^3/_8$ inch diameter. Padlocks shall be protected with not less than $^1/_4$ inch steel hoods constructed so as to prevent sawing or lever action on the locks, hasps and staples. Indoor magazines located in secure rooms that are locked as provided in this paragraph may have each door locked with one steel padlock, which need not be protected by a steel hood, having at least 5 tumblers and a case–hardened shackle of at least $^3/_8$ inch diameter, if the door hinges and lock hasp are securely fastened to the magazine. These requirements do not apply to magazine doors that are adequately secured on the inside by means of a bolt, lock or bar that cannot be actuated from the outside.

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85.

Comm 7.211 Construction of Type 5 magazines. A Type 5 magazine is a building, igloo or "Army–type structure", tunnel, dugout, bin, box, trailer, or a semitrailer or other mobile facility.

(1) OUTDOOR MAGAZINE. (a) *General.* Outdoor Type 5 magazines shall be weather–resistant and theft–resistant. The ground around outdoor magazines shall slope away for drainage or other adequate drainage shall be provided. When unattended, vehicular magazines shall have wheels removed or otherwise be effectively immobilized by kingpin locking devices or other methods approved by the department. The construction of outdoor Type 5 magazines shall comply with the requirements of pars. (b) to (d).

(b) *Construction.* The doors shall be constructed of solid wood or metal.

(c) *Hinges and hasps.* Hinges and hasps shall be attached to doors by welding, riveting, or bolting with nuts on the inside of the door. Hinges and hasps shall be installed so that they cannot be removed when the doors are closed and locked.

(d) *Locks.* Each door shall be equipped with 2 mortise locks; 2 padlocks fastened in separate hasps and staples; a combination of a mortise lock and a padlock; a mortise lock that requires 2 keys to open; or a three–point lock. Padlocks shall have at least 5 tumblers and a case–hardened shackle of at least $^3/_8$ inch diameter. Padlocks shall be protected with not less than $^1/_4$ inch steel hoods constructed so as to prevent sawing or lever action on the locks, hasps and staples. Trailers, semitrailers and similar vehicular magazines may, for each door, be locked with one steel padlock, which need not be protected by a steel hood, having at least 5 tumblers and a case–hardened shackle of at least $^3/_8$ inch diameter, if the door hinges and lock hasps are securely fastened to the magazine and to the door frame. These requirements do not apply to magazine doors that are adequately secured on the inside by means of a bolt, lock or bar that cannot be actuated from the outside.

(2) INDOOR MAGAZINES. (a) *General.* Indoor Type 5 magazines shall be theft–resistant. They need not be weather–resistant if the buildings in which they are stored provide protection from the weather. No indoor magazine may be located in a residence

or dwelling. Indoor magazines containing quantities of blasting agents in excess of 50 pounds are subject to the requirements of s. Comm 7.206. The construction of indoor Type 5 magazines shall comply with the requirements of pars. (b) to (d).

(b) *Construction.* The doors shall be constructed of wood or metal.

(c) *Hinges and hasps.* Hinges and hasps shall be attached to doors by welding, riveting, or bolting with nuts on the inside. Hinges and hasps shall be installed so that they cannot be removed when the doors are closed and locked.

(d) *Locks.* Each door shall be equipped with 2 mortise locks; 2 padlocks fastened in separate hasps and staples; a combination of a mortise lock and a padlock; a mortise lock that requires 2 keys to open; or a three−point lock. Padlocks shall have at least 5 tumblers and a case−hardened shackle of at least $^3/_8$ inch diameter. Padlocks shall be protected with not less than $^1/_4$ inch steel hoods constructed so as to prevent sawing or lever action on the locks, hasps and staples. Indoor magazines located in secure rooms that are locked as provided in this paragraph may have each door locked with one steel padlock, which need not be protected by a steel hood, having at least 5 tumblers and a case−hardened shackle of at least $^3/_8$ inch diameter, if the door hinges and lock hasps are securely fastened to the magazine and to the door frame. These requirements do not apply to magazine doors that are adequately secured on the inside by means of a bolt, lock or bar that cannot be actuated from the outside.

History: Cr. Register, April, 1985, No. 352, eff. 5−1−85.

Comm 7.212 Smoking and open flames. Smoking, matches, open flames and spark producing devices shall not be permitted in any magazine, within 50 feet of any outdoor magazine, or within any room containing an indoor magazine.

History: Cr. Register, April, 1985, No. 352, eff. 5−1−85.

Comm 7.213 Quantity and storage restrictions. (1) MAXIMUM QUANTITIES. Explosive materials in excess of 300,000 pounds or detonators in excess of 20 million shall not be stored in one magazine unless approved by the department.

(2) DETONATOR STORAGE. Except as provided in pars. (a) and (b), detonators shall not be stored in the same magazine with other explosive materials.

(a) In a Type 4 magazine, detonators that will not mass detonate may be stored with electric squibs, safety fuse, igniters and igniter cord.

(b) In a Type 1 or Type 2 magazine, detonators may be stored with delay devices, electric squibs, safety fuse, igniters and igniter cord.

History: Cr. Register, April, 1985, No. 352, eff. 5−1−85.

Comm 7.214 Storage within Types 1, 2, 3 and 4 magazines. The following requirements shall apply to storage within Types 1, 2, 3 and 4 magazines.

(1) PLACEMENT WITHIN MAGAZINES. Explosive materials within a magazine shall not be placed directly against interior walls and shall be stored so as not to interfere with ventilation. To prevent contact of stored explosive materials with walls, a nonsparking lattice work or other nonsparking material may be used.

(2) INVENTORY AND INSPECTION. Containers of explosive materials shall be stored so that labels are visible. Stocks of explosive materials shall be stored so they can be easily counted and checked upon inspection.

(3) OPENING OF CONTAINERS. Except with respect to fiberboard or other nonmetal containers, containers of explosive materials shall not be unpacked or repacked inside a magazine or within 50 feet of a magazine, and shall not be unpacked or repacked close to other explosive materials. Containers of explosive materials shall be closed while being stored.

(4) TOOLS. Tools used for opening or closing containers of explosive materials shall be of nonsparking materials, except that metal slitters may be used for opening fiberboard containers. A wood wedge and a fiber, rubber or wooden mallet shall be used for opening or closing wood containers of explosive materials. Metal tools other than nonsparking transfer conveyors shall not be stored in any magazine containing high explosives.

History: Cr. Register, April, 1985, No. 352, eff. 5−1−85.

Comm 7.215 Housekeeping. (1) CLEANING AND MAINTENANCE. Magazines shall be kept clean, dry, and free of grit, paper, empty packages and containers, and rubbish. Floors shall be regularly swept. Brooms and other utensils used in the cleaning and maintenance of magazines shall have no spark−producing metal parts, and may be kept in magazines. Floors stained by leakage from explosive materials shall be cleaned according to instructions of the explosives manufacturer.

(2) DETERIORATED EXPLOSIVES. When any explosive material has deteriorated it shall be destroyed in accordance with the advice or instructions of the manufacturer or distributor.

Note: Explosive materials are affected by age and storage conditions. Under extreme conditions explosive materials may deteriorate to the point where they are either unfit for use or unusually hazardous. If there is any question about the condition of an explosive material, the manufacturer or distributor should be consulted.

(3) AREA AROUND MAGAZINES. The area surrounding magazines shall be kept clear of rubbish, brush, dry grass, or trees, except live trees more than 10 feet tall, for not less than 25 feet in all directions. Volatile materials shall be kept a distance of not less than 50 feet from outdoor magazines. Living foliage which is used to stabilize the earthen covering of a magazine need not be removed.

History: Cr. Register, April, 1985, No. 352, eff. 5−1−85.

Comm 7.216 Repair of magazines. (1) REMOVING EXPLOSIVES. Before repairing the interior of magazines, all explosive materials shall be removed and the interior cleaned. Before repairing the exterior of magazines, all explosive materials shall be removed if there exists any possibility that repairs may produce sparks or flame.

(2) STORING REMOVED EXPLOSIVES. Explosive materials removed from magazines under repair shall be placed in other magazines appropriate for the storage of those explosive materials, or placed a safe distance from the magazines under repair where they are to be properly guarded and protected until the repairs have been completed.

History: Cr. Register, April, 1985, No. 352, eff. 5−1−85.

Comm 7.217 Lighting. (1) SAFETY LIGHTS. Battery−activated safety lights or battery−activated safety lanterns may be used in explosives storage magazines.

(2) ELECTRIC LIGHTS. Electric lighting used in any explosives storage magazine shall meet the standards prescribed in ch. Comm 16, for the conditions present in the magazine at any time. All electrical switches shall be located outside of the magazine and shall also meet the standards prescribed in ch. Comm 16.

(3) RECORDKEEPING. Copies of invoices, work orders or similar documents which indicate the lighting complies with ch. Comm 16, shall be available for inspection by the department.

History: Cr. Register, April, 1985, No. 352, eff. 5−1−85; corrections made under s. 13.93 (2m) (b) 7., Stats., Register, October, 1996, No. 490.

Comm 7.218 Separation distances for storage of explosive materials. As specified in s. Comm 7.206, outdoor magazines shall be located according to the distances specified in Table 7.218.

(1) MULTIPLE MAGAZINES. Where 2 or more magazines are located on the same property, each magazine shall comply with the minimum distances specified in Table 7.218 from inhabited buildings, railways and highways. The magazines shall be separated from each other by not less than the distances specified for"Separation of Magazines".

(a) The magazine with the greater quantity of explosives shall govern the separating distance, except that the quantity of explo-

sives contained in detonator magazines shall govern in regard to the spacing of the detonator magazine from magazines containing other explosives.

(b) If any 2 or more magazines are separated from each other by less than the specified "Separation of Magazines" distances, then the 2 or more magazines, as a group, shall be considered as one magazine, and the total quantity of explosives stored in the group shall be treated as if stored in a single magazine located on the site of any magazine of the group, and shall comply with the minimum distances specified from other magazines, inhabited buildings, railways and highways.

Note: All types of detonators in strengths through No. 8 detonator should be rated at $1^1/_2$ pounds of explosives per 1,000 detonators. For strengths higher than No. 8 detonator, the manufacturer should be consulted.

Note: For quantity and distance purposes, detonating cord of 50 or 60 grains per foot should be calculated as equivalent to 9 pounds of high explosives per 1,000 feet. Heavier or lighter core loads should be rated proportionately.

TABLE 7.218

TABLE OF DISTANCES FOR STORAGE OF EXPLOSIVES

QUANTITY OF EXPLOSIVES		DISTANCES IN FEET							
		INHABITED BUILDINGS		PUBLIC HIGHWAYS WITH TRAFFIC VOLUME OF LESS THAN 3,000 VEHICLES/DAY		PASSENGER RAILWAYS — PUBLIC HIGHWAYS WITH TRAFFIC VOLUMES OF MORE THAN 3,000 VEHICLES/DAY		SEPARATION OF MAGAZINES	
Pounds Over	Pounds Not Over	Barricaded	Unbarricaded	Barricaded	Unbarricaded	Barricaded	Unbarricaded	Barricaded	Unbarricaded
2	5	70	140	30	60	51	102	6	12
5	10	90	180	35	70	64	128	8	16
10	20	110	220	45	90	81	162	10	20
20	30	125	250	50	100	93	166	11	22
30	40	140	290	55	110	103	206	12	24
40	50	150	300	60	120	110	220	14	28
50	75	170	340	70	140	127	254	15	30
75	100	190	380	75	150	139	278	16	32
100	125	200	400	80	160	150	300	18	36
125	150	215	430	85	170	159	318	19	38
150	200	235	470	95	190	175	350	21	42
200	250	255	510	105	210	189	376	23	46
250	300	270	540	110	220	201	402	24	48
300	400	295	590	120	240	221	442	27	54
400	500	320	640	130	260	236	476	29	58
500	600	340	680	135	270	253	506	31	62
600	700	355	710	145	290	266	532	32	64
700	800	375	750	150	300	278	556	33	66
800	900	390	780	155	310	289	576	35	70
900	1,000	400	800	160	320	300	600	36	72
1,000	1,200	425	850	165	330	318	636	39	78
1,200	1,400	450	900	170	340	336	672	41	82
1,400	1,600	470	940	175	350	351	702	43	86
1,600	1,800	490	980	160	360	366	732	44	88
1,800	2,000	505	1,010	185	370	378	756	45	90
2,000	2,500	545	1,090	190	380	409	816	49	98
2,500	3,000	580	1,160	195	390	432	864	52	104
3,000	4,000	635	1,270	210	420	474	948	58	116
4,000	5,000	685	1,370	225	450	513	1,026	61	122
5,000	6,000	730	1,460	235	470	546	1,092	65	130
6,000	7,000	770	1,540	245	490	573	1,146	68	136
7,000	8,000	900	1,600	250	500	600	1,200	72	144
8,000	9,000	935	1,670	255	510	624	1,248	75	150

TABLE 7.218 – Continued

TABLE OF DISTANCES FOR STORAGE OF EXPLOSIVES

QUANTITY OF EXPLOSIVES		DISTANCES IN FEET							
		INHABITED BUILDINGS		PUBLIC HIGHWAYS WITH TRAFFIC VOLUME OF LESS THAN 3,000 VEHICLES/DAY		PASSENGER RAILWAYS — PUBLIC HIGHWAYS WITH TRAFFIC VOLUMES OF MORE THAN 3,000 VEHICLES/DAY		SEPARATION OF MAGAZINES	
Pounds Over	Pounds Not Over	Barricaded	Unbarricaded	Barricaded	Unbarricaded	Barricaded	Unbarricaded	Barricaded	Unbarricaded
9,000	10,000	865	1,730	260	520	645	1,290	78	156
10,000	12,000	875	1,750	270	540	687	1,374	82	164
12,000	14,000	885	1,770	275	550	723	1,446	97	174
14,000	16,000	900	1,800	280	560	756	1,512	90	190
16,000	18,000	940	1,880	285	570	786	1,572	94	188
18,000	20,000	975	1,950	290	580	813	1,626	98	196
20,000	25,000	1,055	2,000	315	630	876	1,752	105	210
25,000	30,000	1,130	2,000	340	680	933	1,966	112	224
30,000	35,000	1,205	2,000	360	720	981	1,962	119	239
35,000	40,000	1,275	2,000	380	760	1,026	2,000	124	248
40,000	45,000	1,340	2,000	400	800	1,068	2,000	129	258
45,000	50,000	1,400	2,000	420	840	1,104	2,000	135	270
50,000	55,000	1,460	2,000	440	880	1,140	2,000	140	280
55,000	60,000	1,515	2,000	455	910	1,173	2,000	145	290
60,000	65,000	1,565	2,000	470	940	1,206	2,000	150	300
65,000	70,000	1,610	2,000	485	970	1,236	2,000	155	310
70,000	75,000	1,655	2,000	500	1,000	1,263	2,000	160	320
75,000	80,000	1,695	2,000	510	1,020	1,293	2,000	165	330
80,000	85,000	1,730	2,000	520	1,040	1,317	2,000	170	340
85,000	90,000	1,760	2,000	530	1,060	1,344	2,000	175	350
90,000	95,000	1,790	2,000	540	1,080	1,368	2,000	180	360
95,000	100,000	1,815	2,000	545	1,090	1,392	2,000	185	370
100,000	110,000	1,835	2,000	550	1,100	1,437	2,000	195	390
110,000	120,000	1,855	2,000	555	1,110	1,479	2,000	205	410
120,000	130,000	1,875	2,000	560	1,120	1,521	2,000	215	430
130,000	140,000	1,890	2,000	565	1,130	1,557	2,000	225	450
140,000	150,000	1,900	2,000	570	1,140	1 593	2,000	235	470
150,000	160,000	1,935	2,000	580	1,160	1,629	2,000	245	490
160,000	170,000	1,965	2,000	590	1,160	1,662	2,000	255	510
170,000	180,000	1,990	2,000	600	1,200	1,695	2,000	265	530
180,000	190,000	2,010	2,010	605	1,210	1,725	2,000	275	550
190,000	200,000	2,030	2,030	610	1,220	1,755	2,000	285	570
200,000	210,000	2,055	2,055	620	1,240	1,782	2,000	295	590
210,000	230,000	2,100	2,100	635	1,270	1,836	2,000	315	630
230,000	250,000	2,155	2,155	650	1,300	1,890	2,000	335	670
250,000	275,000	2,215	2,215	670	1,340	1,950	2,000	360	720
275,000	300,000	2,275	2,275	690	1,380	2,000	2,000	385	770

(2) BARRICADED MAGAZINES. In using Table 7.218, a magazine shall be considered barricaded whenever:

(a) It is screened from an inhabited building or other magazine, either by natural features of the ground or by an artificial barricade of such height that a straight line drawn from the top of any sidewall of the magazine to any part of the building to be protected will pass through the intervening barricade; or

(b) It is screened from a railway or highway, either by natural features of the ground or by an artificial barricade of such height that a straight line drawn from the top of any sidewall of the magazine to a point 12 feet above the center of the railway or highway will pass through the intervening barricade.

(3) MINING LOCATIONS. Explosives magazines, except detonator magazines, shall not be located nearer than 200 feet from regular operating places of any mine or quarry, or from any mine shaft, tunnel or slope opening at the surface. Table 7.218 shall not apply at these places.

History: Cr. Register, April, 1985, No. 352, eff. 5−1−85; am. (1) (a), Register, October, 1999, No. 526, eff. 11−1−99.

Comm 7.219 Separation distances for storage of low explosives. As specified in s. Comm 7.206, outdoor magazines in which low explosives are stored shall be located according to the distances specified in Table 7.219.

TABLE 7.219
SEPARATION DISTANCES FOR STORAGE OF LOW EXPLOSIVES

Quantity of Explosives in Pounds		Distances in Feet		
Over	Not Over	From Inhabited Buildings	From Public Railways and Highways	From Above Ground Magazines
0	1,000	75	75	50
1,000	5,000	115	115	75
5,000	10,000	150	150	100
10,000	20,000	190	190	125
20,000	30,000	215	215	145
30,000	40,000	235	235	155
40,000	50,000	250	250	165
50,000	60,000	260	260	175
60,000	70,000	270	270	185
70,000	80,000	280	280	190
80,000	90,000	295	295	195
90,000	100,000	300	300	200
100,000	200,000	375	375	250
200,000	300,000	450	450	300

History: Cr. Register, April, 1985, No. 352, eff. 5−1−85.

Comm 7.22 Separation distances for ammonium nitrate and blasting agents. As specified in s. Comm 7.206, ammonium nitrate and blasting agents shall be located according to the distances specified in Table 7.220.

(1) EXPLOSION BY PROPAGATION. Table 7.220 specifies separation distances to prevent explosion of ammonium nitrate and ammonium nitrate−based blasting agents by propagation from nearby stores of high explosives or blasting agents referred to in the table as the donor. Ammonium nitrate, by itself, is not considered to be a donor when applying this table. Ammonium nitrate, ammonium nitrate−fuel oil or combinations thereof are acceptors. If stores of ammonium nitrate are located within the sympathetic detonation distance of explosives or blasting agents, one−half the mass of the ammonium nitrate shall be included in the mass of the donor.

(2) UNBARRICADED DISTANCES. When the ammonium nitrate or blasting agent or both is not barricaded, the distances shown in Table 7.220 shall be multiplied by 6. These distances allow for the possibility of high velocity metal fragments from mixers, hoppers, truck bodies, sheet metal structures, metal containers, and the like which may enclose the donor. Where explosives storage is in bullet−resistant magazines or where the storage is protected by a bullet−resistant wall, distances and barricade thicknesses in excess of those prescribed in Table 7.218 are not required.

(3) BARRICADES. Earth or sand dikes, or enclosures filled with the prescribed minimum thickness of earth or sand, are acceptable artificial barricades. Natural barricades, such as hills or timber of sufficient density that the surrounding exposures which require protection cannot be seen from the"donor" when the trees are bare of leaves, are also acceptable.

(4) OTHER SEPARATION DISTANCES. For determining the distances to be maintained from inhabited buildings, passenger railways, and public highways, Table 7.218 shall be used.

TABLE 7.220
SEPARATION DISTANCES OF AMMONIUM NITRATE AND BLASTING AGENTS FROM EXPLOSIVES OR BLASTING AGENTS

Donor Weight in Pounds		Minimum Separation Distance of Acceptor from Donor When Barricaded (Feet)		Minimum Thickness of Artificial Barricades (Inches)
Over	Not Over	Ammonium Nitrate	Blasting Agent	
	100	3	11	12
100	300	4	14	12
300	600	5	18	12
600	1,000	6	22	12
1,000	1,600	7	25	12
1,600	2,000	8	29	12
2,000	3,000	9	32	15
3,000	4,000	10	36	15
4,000	6,000	11	40	15
6,000	8,000	12	43	20
8,000	10,000	13	47	20
10,000	12,000	14	50	20
12,000	16,000	15	54	25
16,000	20,000	16	58	25
20,000	25,000	18	65	25
25,000	30,000	19	68	30
30,000	35,000	20	72	30
35,000	40,000	21	76	30
40,000	45,000	22	79	35
45,000	50,000	23	83	35
50,000	55,000	24	86	35
55,000	60,000	25	90	35
60,000	70,000	26	94	40
70,000	80,000	28	101	40
80,000	90,000	30	108	40
90,000	100,000	32	115	40
100,000	120,000	34	122	50
120,000	140,000	37	133	50

TABLE 7.220 – Continued
SEPARATION DISTANCES OF AMMONIUM NITRATE AND BLASTING AGENTS FROM EXPLOSIVES OR BLASTING AGENTS

Donor Weight in Pounds		Minimum Separation Distance of Acceptor from Donor When Barricaded (Feet)		Minimum Thickness of Artificial Barricades (Inches)
Over	Not Over	Ammonium Nitrate	Blasting Agent	
140,000	160,000	40	144	50
160,000	180,000	44	158	50
180,000	200,000	48	173	50
200,000	220,000	52	187	60
220,000	250,000	56	202	60
250,000	275,000	60	216	60
275,000	300,000	64	230	60

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85.

Comm 7.23 Underground storage of explosives. **(1)** GENERAL REQUIREMENTS. (a) Magazines shall be kept clean and dry, and empty containers and packing materials shall be removed from the mine at least once a week.

(b) Magazines shall be lighted from the outside, by portable safety storage battery lamps or by permanent interior lights provided with explosion–proof fixtures. Open flame lamps, matches, lighters and flame–producing devices shall not be carried into any explosives magazine. Smoking shall not be permitted while handling explosives.

(c) All unused explosive materials shall be returned to the approved storage locations immediately following loading of the holes.

(2) LOCATION. (a) Magazines for the underground storage of explosive materials shall be located at least 200 feet from any work shaft or connecting winze or raise.

(b) Detonators and other explosive materials shall not be stored in the same magazine. Detonator magazines shall be separated from other explosives magazines by at least 25 feet.

(c) Magazines shall not be adjacent to any power circuit other than lighting circuits, nor shall they be located so that accidental explosion of their contents would cut off the escape of persons working underground.

(d) All underground magazines shall be located and protected so as to prevent accidental impact from vehicles or falling objects, and shall be located out of the line of blasts.

(e) Underground magazines shall be located in separate rooms or drifts in which no person, other than powder personnel, are employed.

(f) When underground magazines are accessible through unlocked entrances, the magazines shall be locked.

(g) Any underground operation in which explosives are stored shall have at least 2 separate means of exit.

(3) CONSTRUCTION. (a) Underground magazines used to store explosives or detonators shall be constructed with only nonsparking material inside and equipped with covers or doors.

(b) All underground magazines shall be visibly marked "EXPLOSIVES".

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85.

Comm 7.24 Storage of black powder. **(1)** GENERAL. Black powder shall be stored in manufacturer's original shipping containers.

(2) RESIDENTIAL STORAGE. Black powder intended for personal use in quantities not exceeding a total of 20 pounds may be stored in residences and associated buildings if kept in the manufacturer's original shipping containers and stored in a wooden box or cabinet having walls of at least one–inch nominal thickness.

(3) COMMERCIAL DISPLAY. Not more than one pound of black powder may be displayed in commercial establishments.

(4) COMMERCIAL STORAGE. (a) Commercial stocks in a building in quantities not exceeding 50 pounds shall be stored in a Type 4 indoor magazine.

(b) Commercial stocks in quantities exceeding 50 pounds shall be stored in a Type 4 outdoor magazine.

(5) COMBINED STORAGE. If smokeless propellants are stored in the same magazine with black powder, the total quantity shall not exceed that permitted for black powder.

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85; renum. from Comm 7.58 and am. (2), Register, October, 1999, No. 526, eff. 11–1–99.

Subchapter III — Transportation of Explosive Materials

Comm 7.25 General transportation requirements. **(1)** APPLICATION. The requirements of this section apply to the on–site transportation of explosive materials on roadways not open to the public.

Note: The transportation of explosive materials on public highways is regulated by the Wisconsin department of transportation under chs. Trans 325 to 328.

(2) GENERAL REQUIREMENTS. (a) Explosive materials shall not be carried in the same compartment with flammable or corrosive materials. Explosive materials, other than blasting agents, shall not be carried in the same compartment with spark–producing metal tools.

(b) Explosive materials shall be transported or conveyed in original outside boxes. A "full cover" type paper carton shall be considered equivalent to the original box when the cover is replaced and taped. Damaged cases shall be placed in boxes as specified in s. Comm 7.208 (3) or in a daily supply box.

(c) Detonators may be transported in the same vehicle with high explosives provided the detonators are packed in containers meeting one of the following construction requirements.

1. The top, lid or door, sides and bottom surfaces of each container or compartment shall be a laminate construction of A/C grade or better exterior plywood, sheetrock, and low–carbon steel. In order of arrangement, from inside to outside, the laminate materials shall each be a minimum of $^1/_2$ inch plywood, $^1/_2$ inch sheetrock and $^1/_8$ inch low–carbon steel. A $^1/_4$ inch lamination of A/C plywood is required on the exterior portion of a container or compartment that may contact other explosives carried on the same vehicle.

2. The top, lid or door, sides and bottom surfaces of each container or compartment shall be a laminate construction of A/C grade or better exterior plywood, solid hardwood, asbestos board or sheetrock, and sheet metal. In order of arrangement, from inside to outside, the laminate materials shall each be a minimum of $^1/_4$ inch plywood, 1–inch solid hardboard, $^1/_2$ inch plywood, $^1/_2$ inch sheetrock or $^1/_4$ inch asbestos board, and 22–gauge sheet metal.

(d) Cases of explosive materials shall not be dropped, slid, or otherwise roughly handled.

(3) TRANSPORTATION VEHICLES. (a) The vehicle transporting explosive materials shall have a tight floor. If there is any exposed metal on the inside of the body, it shall be covered or protected with nonsparking material so that the explosive materials containers will not come in contact with the exposed sparking metal.

(b) The vehicle transporting explosive materials shall be clean and free from surplus oil and grease, and shall have wiring completely insulated and fuel and exhaust lines free from leaks. All necessary precautions shall be taken to prevent the vehicle from catching fire.

(c) In an open vehicle transporting explosive materials, the sides of the body shall be high enough to prevent cases from fall-

ing off. If a tarpaulin is used to cover the explosive materials, the tarpaulin shall be flame–retardant and moisture–proof.

(4) FIRE EXTINGUISHERS. (a) The vehicle transporting explosive materials shall be equipped with at least 2 fire extinguishers with a minimum rating of 2–A:10–B:C or one fire extinguisher and an approved automatic fire suppression system.

(b) Fire extinguishers shall be an Underwriter's Laboratories listed type and shall be located on the power unit and properly maintained.

Note: These extinguishers are effective against ordinary truck fires but are not effective against fires involving explosive materials. Fires involving explosive materials should not be fought and the area should be evacuated as rapidly as possible.

(5) OPERATION OF TRANSPORTATION VEHICLES. (a) The vehicle transporting explosive materials shall be handled in a safe and careful manner.

(b) The vehicle transporting explosive materials shall be driven by a competent driver at least 21 years of age. Drivers shall be familiar with all applicable federal, state and local regulations.

(c) No person may ride upon, drive, load or unload a vehicle transporting explosive materials while smoking or under the influence of intoxicants or drugs.

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85; am. (3) (a), Register, September, 1994, No. 465, eff. 10–1–94; corrections made under s. 13.93 (2m) (b) 7., Stats., Register, October, 1996, No. 490; r. and recr., Register, October, 1999, No. 526, eff. 11–1–99.

Comm 7.26 Transporting underground. (1) TRAIN OR TRUCK. No explosive materials may be transported on underground locomotives, but they may be transported in a mine car or in a truck, if carried in their original shipping containers or in other approved containers. No one but the train crew, driver or powder personnel may ride on a train or truck carrying explosive materials. One empty car with insulated couplings or an insulated bar shall be interposed between the locomotive and the powder car.

(2) SINKING SHAFTS. In sinking a shaft or winze, no other material may be carried on any cage, skip or bucket on which explosive materials are handled. Only those members of the crew needed for blasting may travel with the explosive materials or remain on the bottom while explosives are being lowered. Explosive materials may be handled only in their original shipping packages or in approved containers.

(3) LOWERING EXPLOSIVES. When lowering explosive materials for storage in underground magazines or transferring explosives from level to level, no person other than the attendant, may ride, nor may any other material be handled, in any cage or conveyance which is loaded with explosive materials. Detonators and other explosives shall not be lowered or hoisted together on any conveyance.

(4) AIR LOCKS. While explosive materials are being taken through air locks, no person other than the lock tender and the carrier may be permitted in the lock.

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85.

Subchapter IV — Use of Explosive Materials

Comm 7.30 General handling and use of explosives. (1) GENERAL REQUIREMENTS. (a) Persons handling explosive materials shall possess a valid blaster's license or be supervised by a holder of a valid license.

(b) Persons shall not handle explosive materials while under the influence of intoxicants or drugs.

(c) When any blasting is done in congested areas or in close proximity to a structure, railroad, public roadway or highway or any other installation that may be damaged, precautions in the loading, delaying, initiation and confinement of each blast shall be exercised to prevent bodily injury and property damage and to minimize ground vibrations, air blasts and thrown fragments.

(d) Except for the purpose of lighting safety fuse, there shall be no smoking, open flames, sparks, or use of matches or lighters within 100 feet of the place where explosive charges are being prepared.

(e) Whenever blasting is being conducted in the vicinity of gas, electric, water, fire alarm, telephone, telegraph and steam utilities, these utilities shall be notified.

Note: Section 182.0175 (2), Stats., states that advance notice of not less than 3 working days shall be provided.

(f) Explosive materials shall not be abandoned. If undetonated explosives are found, they shall be reported to and handled by a competent and experienced person.

Note: Although blasting agents are generally less sensitive to accidental initiation than other explosives, they are still an explosive and should be handled with the care and respect due these products. It should be remembered that in use they are virtually always combined with a detonator–sensitive explosive and the entire charge should be accorded the respect due the most sensitive element.

(2) BLAST SITE HANDLING REQUIREMENTS. (a) Explosive materials shall be handled in original shipping containers, approved covered wooden boxes or sacks provided for that purpose.

(b) Detonators, primers and other explosives shall be carried in separate containers when transported manually.

(c) After loading is completed, all surplus explosive materials shall be returned to an approved magazine.

(d) Explosive materials stacked near the blast hole shall not exceed the approximate amount required for the shot. Explosive materials shall not be placed where they may be struck by vehicles or subject to contact with live wires.

(e) After explosive materials are laid out on the blast pattern, the blast site shall be guarded against approach of vehicles and unauthorized persons until the shot is fired.

(f) Blast holes shall be cleared of obstructions before loading.

(g) Blast holes heated from drilling or enlarging shall not be loaded until they have cooled to less than 150° Fahrenheit.

(h) In a tunnel or shaft, no blast hole may be loaded until a round of holes is completely drilled.

(3) FUME CLASS. Explosive materials used in underground blasting shall be fume class 1; however, fume class 2 and fume class 3 may be used if adequate ventilation has been provided as determined by the blaster in charge.

Note: Fume class 1 explosives produce less than 0.16 cubic feet of poisonous gases per $1^1/_4 \times 8''$ cartridge when detonated in the Bichel Gauge.

(4) TAMPING. (a) All tamping poles and connectors shall be constructed of wood or other nonsparking material, other than aluminum.

Note: Some nonsparking metals and some plastics are not safe for use as tamping poles because of the potential hazard from friction.

(b) During tamping of explosive materials, excessive ramming shall be avoided. The primer shall not be tamped.

(5) DRILLING. (a) Drilling into explosive materials or into any portion of a hole which at one time contained explosive materials shall not be allowed.

(b) Holes shall not be drilled where there is danger of intersecting a charged or misfired hole.

(6) PNEUMATIC LOADING. (a) All elements of pneumatic loading devices shall be electrically bonded together and a positive grounding device for the equipment shall be used to prevent the accumulation of static electricity. Water lines, air lines, rails or permanent electric grounding systems for other equipment shall not be used to ground pneumatic loading equipment.

(b) The hose or tube used in the pneumatic loading system to convey the blasting agent from the hopper into the borehole shall be of the semi–conductive type. The resistance of the hose or tube shall be not less than 1,000 ohms per foot nor more than 2 million ohms for the entire length.

Note: Periodic checks should be made of the hose or tube to assure that the resistance does not change to a value outside the safe operating limits.

(c) Plastic or other nonconductive sleeves or liners shall not be used in boreholes being loaded pneumatically unless a positive grounding method is used inside the liner.

(7) STEMMING. All blast holes in open work shall be stemmed to the collar or to a point which will confine the charge.

(8) HOUSEKEEPING. Empty explosive materials packaging shall be properly disposed of immediately following the blast.

Note: Local fire department authorities and the Wisconsin department of natural resources should be consulted regarding outdoor burning regulations.

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85; am. (1) (c), (2) (e), (3), (6) (b), r. and recr. (8), Register, October, 1999, No. 526, eff. 11–1–99.

Comm 7.31 Preparation of primers. (1) GENERAL. All primers shall be made as recommended by the manufacturer.

Note: The manufacturer's recommendations are found on "case inserts" in every case of explosives. Primers of adequate size and properties should be used to insure against misfires and incomplete detonations. Failure to use adequate priming not only results in poor performance, but also can cause copious quantities of toxic gases to be generated when the charge is fired.

(2) PREPARATION LOCATION. Primers shall be made at the site just prior to loading in the borehole.

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85; am. (2), r. (3), Register, October, 1999, No. 526, eff. 11–1–99.

Comm 7.32 Firing blasts with non–electric systems. (1) GENERAL. Blasting operations shall be suspended and all persons shall be removed from the blast area during the approach and progress of an electric storm.

(2) FIRING BLASTS WITH CAP AND FUSE. (a) Only an approved crimper shall be used for attaching detonators to safety fuse. Capped fuses shall be made up only as required, and safety fuses shall not be capped in any magazine.

(b) The burning rate of each spool of safety fuse to be used shall be measured and recorded.

(c) Before capping safety fuse, a short length shall be cut from the end of the supply reel so as to assure a fresh cut end in each detonator.

(d) The minimum safety fuse length for all blasts shall be 48 inches and sufficient to provide a minimum fuse burning time of 2 minutes.

(e) At least 2 persons shall be present at each location where cap and fuse blasting is done.

(f) The safety fuse shall not be lit before placing the primer in position.

(g) Cap and fuse shall not be used for firing mud cap charges unless the charges are separated sufficiently to prevent one charge from dislodging other shots in the vicinity.

(h) Cap and fuse shall not be used for blast initiation in communities, or on highways or adjacent to highways open to traffic.

(3) FIRING BLASTS WITH DETONATING CORD. (a) Detonating cord shall be matched to the blasting methods and type of explosive materials being used.

(b) Detonating cord shall be handled as carefully as other explosive materials.

(c) Detonating cord shall be cut from the spool before loading the main explosive charge. When explosive cartridges are attached to detonating cord for special applications, the cord shall be cut from the spool once the charge is loaded. The cord shall be cut with a sharp knife, razor blade or other instrument designed for cutting detonating cord. Detonating cord shall not be cut with devices such as scissors, cap crimpers, plier type cutters or similar instruments.

(d) Detonating cord to cord connections shall be made tight in accordance with manufacturer's instructions.

(e) Detonators shall be attached to detonating cord with tape or by a method recommended by the manufacturer. The detonators shall point toward the direction of detonation. The cord–initiating detonator shall be attached at least 6 inches from the cut end of the detonating cord.

(f) A properly sized primer shall be used to initiate wet detonating cord.

(g) Detonating cord shall not be handled in such a manner to allow loops, kinks or sharp angles that might direct the cord back toward the oncoming line of detonation.

(h) Damaged detonating cord shall not be used.

(i) Detonators for initiating the blast shall not be attached to detonating cord until the blast area has been cleared and secured for the blast.

(j) A miniaturized detonating cord system shall use explosives that are insensitive to initiation by the miniaturized detonating cord.

(k) Sections of miniaturized detonating cord shall not be joined together.

(L) Detonating cord shall not be initiated with a surface delay connector designed for the initiation of shock tube only. When used with detonating cord, surface delay connectors shall be designed for use with the cord.

(4) FIRING BLASTS WITH SHOCK TUBE. (a) Shock tube connections to detonating cord shall be at right angles to prevent angle cut–offs.

(b) Situations shall be avoided where initiation system components can become entangled in machines, equipment, vehicles or moving parts thereof.

(c) Vehicles or equipment shall not be driven over shock tube.

(d) A shock tube shall not be pulled, stretched, kinked or put under tension such that the tube could be caused to break or otherwise malfunction.

(e) Shock tube shall be kept in an orderly manner to allow for visual inspection.

(f) The manufacturer's recommendations shall be followed when cutting and splicing lead–in trunkline shock tube. No other cutting or splicing of shock tube is allowed.

(g) Shock tubes shall not be tied together.

Note: An initiation signal will not pass through a knotted connection.

(h) Surface delay connectors shall not be hooked up until the blast is ready to fire.

(i) Surface delay connectors shall be protected from unintended energy sources such as impact from falling rock, impact from track vehicles or other mobile equipment, drilling equipment, flame, friction, electrical discharge from power lines, static electricity and lightning.

(j) A surface delay connector shall not be hooked up to its own shock tube.

(k) Any unused detonating device in a shot shall be kept as far away as possible from any shock tube.

(L) The detonator shall not be removed from a surface delay connector block.

(m) Non–electric leads shall not be held during firing.

(n) Surface delay connectors shall be unhooked prior to handling a misfire.

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85; am. (3), Register, September, 1994, No. 465, eff. 10–1–94; r. and recr., Register, October, 1999, No. 526, eff. 11–1–99.

Comm 7.33 Firing blasts with electricity. (1) INDUCED CURRENTS. Precautions shall be taken to prevent accidental discharge of electric detonators from current induced by radar, wireless communication equipment, lightning, adjacent power lines, dust and snow storms, or other sources of induced current. The precautions shall include:

(a) The suspension of all blasting operations and removal of persons from the blast area during the approach and progress of an electric storm;

(b) The posting of signs warning against the use of mobile wireless communication equipment on all roads within 1000 feet of the blasting operations; and

(c) Compliance with the requirements with regard to blasting in the vicinity of wireless communication equipment or power lines as specified in sub. (5).

(2) STRAY CURRENTS. (a) Before adopting any system of electrical firing, the blaster shall conduct a thorough survey for possible stray current, and if 50 milliamperes or more are detected, the stray current shall be eliminated before any holes are loaded. Periodic recheck surveys shall also be made.

Note: Alternate instruments or techniques that produce equivalent results will be acceptable.

(b) The metallic exterior of electrical equipment shall be grounded with a resistance to ground of not more than one ohm.

(c) Before introducing electric detonators to a blast, all portable or temporary electric circuits within 50 feet of the blast site shall be de−energized.

(3) ELECTRIC CIRCUIT REQUIREMENTS. (a) Before stemming holes, electric detonators shall be tested for circuit continuity with a blasting galvanometer or other approved instrument. In case a detonator wire is broken, a new primer shall be inserted or an alternate method of initiation shall be employed. Except for circuit testing, the leg wires shall be kept short−circuited until they are connected into the blast circuit.

(b) All blast circuits shall be tested with a blasting galvanometer or other approved instrument before firing.

(c) All electric detonators fired in a single blast shall be made by the same manufacturer.

(d) Where electric haulage is used, all rail bonds shall be properly maintained and all rails and pipe lines shall be cross−bonded and grounded.

(e) The entire firing circuit shall be insulated and no electrical ground shall be permitted. All parts of the blasting circuit shall be protected from accidental contact with power lines, pipelines or other sources of stray current.

(f) All connections shall be made progressively from the blast holes back to the source of firing current. The leading wire shall remain shorted and not be connected to the blasting machine or other source of current until the blast is to be fired.

(g) Power sources shall be suitable for the number of electric detonators to be fired and for the type of circuits used.

(h) Blasting machines shall be tested periodically to insure their ability to develop their rated capacity. If defective, they shall not be used.

(i) Only insulated leading wire of adequate current−carrying capacity shall be used.

(4) POWER CIRCUIT FIRING. (a) When firing with a power circuit, a firing switch shall always be used. This switch shall be locked in the "open" or "off" position at all times except when firing a blast. It shall be designed so that the firing lines are short−circuited when the switch is in the "open" or "off" position.

(b) The firing switch box shall be kept locked except when blasting and no person may have access to it except the blaster.

(c) On the power side of the switch, at least a 15−foot lightning gap shall be provided which shall be closed by a jumper immediately prior to the time of firing.

(d) No electric firing may be done with a power line voltage of less than 110 volts nor more than 480 volts.

(5) RADIO FREQUENCY HAZARDS. (a) Electric detonators shall not be stored or transported in the vicinity of operating wireless communication equipment unless they are in their original package or coiled as specified by the manufacturer. If not in their original package, they shall be kept in a closed metal container.

(b) When electric detonators are used or handled in the vicinity of known operating wireless communication equipment, the requirements as specified in Tables 7.33−1 to 7.33−7 shall be followed.

Note: These tables were taken from the Institute of Makers of Explosives safety library publication no. 20, "Safety Guide for the Prevention of Radio Frequency Radiation Hazards in the Use of Commercial Electric Detonators", and were derived from analytical "worst−case" calculations. They are based on an assumed 40−milliwatt no−fire level of commercial detonators.

(c) When it is not possible to determine if the requirements of Tables 7.33−1 to 7.33−7 can be met, the following test or other approved test shall be conducted to determine if a radio frequency hazard exists. A #48 or #49 radio pilot lamp shall be inserted into a blasting test circuit in place of the electric detonator. If any glow is observed in the lamp, electrical firing shall not be used.

Table 7.33−1

Recommended Distances for Commercial AM Broadcast Transmitters 0.535 to 1.605 MHz

Transmitter Power (1) (Watts)	Minimum Distance (Feet)
Up to 4,000	800
4,001 to 5,000	900
5,001 to 10,000	1,300
10,001 to 25,000	2,000
25,001 to 50,000(2)	2,900
50,001 to 100,000	4,100
100,001 to 500,000	9,100

(1) Power delivered to antenna.
(2) 50,000 watts is the maximum power of U.S. broadcast transmitters in this frequency range.

Table 7.33−2

Recommended Distances for Transmitters up to 50 MHz (Excluding AM Broadcast) Calculated for a Specific Loop Pickup Configuration (1) (2)

Transmitter Power (3) (Watts)	Minimum Distance (Feet)
Up to 100	800
101 to 500	1,700
501 to 1,000	2,500
1,001 to 5,000	5,500
5,001 to 50,000	17,000
50,001 to 500,000(4)	55,000

(1) Based on the configuration where the loop is placed in the plane of the transmitting antenna, using 20.8 MHz, which is the most sensitive frequency.
(2) This table should be applied to International Broadcast Transmitters in the 10−25 MHz range.
(3) Power delivered to antenna.
(4) Maximum for International Broadcast.

Table 7.33–3

Recommended Distances of Mobile Transmitters Including Amateur and Citizens' Band

Minimum Distance (Feet)

Transmitter Power (1) (Watts)	MF 1.6 to 3.4 MHz Industrial	HF 28 to 29.7 MHz Amateur	VHF 35 to 36 MHz Public Use 42 to 44 MHz Public Use 50 to 54 MHz Amateur	VHF 144 to 148 MHz Amateur 150.8 to 161.6 MHz Public Use	UHF 450 to 470 MHz Public Use Cellular Automobile Telephones Above 800 MHz
Up to 5	30	70	60	20	10
6 to 10	40	100	80	30	20
11 to 50	90	230	180	70	40
51 to 100	120	320	260	100	60
101 to 180(2)	170	430	350	130	80
181 to 250	200	500	410	160	90
251 to 500(3)	280	710	580	220	120
501 to 600(4)	300	780	640	240	140
601 to 1,000(5)	400	1,010	820	310	180
1,001 to 10,000(6)	1,240	3,200	2,600	990	560

Citizens Band, Class D Transmitters, 26.96–27.41 MHz

	Recommended Minimum Distance	
Type	Hand–Held	Vehicle Mounted
Double Sideband—4 watts maximum transmitter power	5 ft.	65 ft.
Single Sideband—12 watts peak envelope power	20 ft.	110 ft.

(1) Power delivered to antenna.
(2) Maximum power for two–way mobile units in VHF (150.8 to 161.6 MHz range) and for two–way mobile and fixed station units in UHF (450 to 460 MHz range).
(3) Maximum power for major VHF two–way mobile and fixed station units in 35 to 44 MHz range.
(4) Maximum power for two–way fixed station units in VHF (150.8 to 161.6 MHz range).
(5) Maximum power for amateur radio mobile units.
(6) Maximum power for some base stations in 42 to 44 MHz band and 1.6 to 1.8 MHz band.

Table 7.33–4

Recommended Distances for VHF TV and FM Broadcasting Transmitters

Effective Radiated Power (Watts)	Minimum Distance (Feet) Channels 2 to 6	FM Radio	Channels 7 to 13
Up to 1,000	1,000	800	600
1,001 to 10,000	1,800	1,400	1,000
10,001 to 100,000(1)	3,200	2,600	1,900
100,001 to 316,000(2)	4,300	3,400	2,500
316,001 to 1,000,000	5,800	4,600	3,300
1,000,001 to 10,000,000	10,200	8,100	5,900

(1) Maximum power channels 2 to 6 and FM—100,000 watts.
(2) Maximum power channels 7 to 13—316,000 watts.

Table 7.33–5

Recommended Distances from UHF TV Transmitters

Effective Radiated Power (Watts)	Minimum Distance (Feet)
Up to 10,000	600
10,001 to 1,000,000	2,000
1,000,001 to 5,000,000(1)	3,000
5,000,001 to 100,000,000	6,000

(1) Maximum power channels 14 to 83 – 5,000,000 watts.

Table 7.33–6

Recommended Distances from Maritime Radionavigational Radar

Service	Effective Radiated Power (Watts)	Minimum Distance (Feet)
Small Pleasure Craft	Up to 500	20
Harbor Craft, River Boats	501 to 5,000	50
Large Commercial Shipping	5,001 to 50,000	300

Table 7.33–7

Recommended Distances from Radio Navigation Beacons

Type of Beacon	Power (Watts)	Frequency (MHz)	Minimum Distance (Feet)
Omega	10,000	0.01	45
Loran–C	1,000,000	0.1	650
VOR	100	110	110
Localizer	100	110	110
Guide Slope	15	315	25

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85; am. (4) (c), Register, September, 1994, No. 465, eff. 10–1–94; am. (1), (2) (c), (3) (a), (c), (g), (5), Tables 7.33–1, 7.33–2 and 7.33–4, r. and recr. Table 7.33–3, cr. Table 7.33–7, Register, October, 1999, No. 526, eff. 11–1–99.

Comm 7.34 Blast warnings and shelter. (1) SURFACE BLASTING WARNINGS. (a) Before any surface blast is fired, 3 distinctive warning signals shall be sounded. One all–clear signal shall be sounded after the blast area has been inspected by the blaster in charge. Air horns, klaxon horns or sirens shall be used as warning signals.

(b) Before any surface blast is fired, all persons shall retire to a safe sheltered area away from the blast site. If shelters are not available, persons shall retire to a safe distance outside the blast area as determined by the blaster in charge.

(c) Warning signs, indicating a blast area, shall be maintained at all access roads to the blast area. The warning sign lettering shall be not less than 4 inches in height on a contrasting background.

(d) Upon final hookup, all access roads to the blast area not open to the public shall be guarded or barricaded to prevent the passage of persons or vehicles. Flag persons shall be safely stationed on public roadways and highways that pass through the blast area so as to stop traffic during blasting operations.

(2) UNDERGROUND BLASTING WARNINGS. (a) Persons about to fire underground blasts shall cause warning to be given in every direction, and all entrances to the place where the blasts are to be fired shall be manned or barricaded.

(b) All persons shall retire to a safe distance from the face of a tunnel being blasted.

(c) Persons shall not be permitted to retire to a dead−end drift or crosscut in selecting shelter from fly rock and blasting gases.

(d) Whenever blasting is being done in a tunnel at points likely to break through to where other persons are at work, the blaster in charge shall, before any holes are loaded, give warning of danger to all persons who may be working where the blasts may break through, and shall not allow any holes to be charged until a warning is acknowledged and persons are removed.

Note: Underground blasting regulations are also issued by the federal occupational safety and health administration and the federal mine safety and health administration.

(3) SPECIAL BLASTING OPERATIONS. (a) When chambering blast holes, persons shall retire to not less than 75 feet from the collar of the hole. The use of explosives to de−water blast holes is prohibited.

(b) When blasting in a building, the charge shall be properly designed, placed and covered if necessary to prevent damage to persons or property. Passageways shall be guarded manually. Warnings shall be sounded and persons shall retire to a sheltered place. Guards shall not be required to use flags or signs.

History: Cr. Register, April, 1985, No. 352, eff. 5−1−85; am. (1) (a), Register, September, 1994, No. 465, eff. 10−1−94; r. and recr. (1), am. (2) (d) and (3) (a), Register, October, 1999, No. 526, eff. 11−1−99.

Comm 7.35 Blasting in communities. (1) BLASTER REQUIREMENTS. When blasting operations are conducted in communities, the shots shall be designed and initiated by a properly licensed Class 5, 6 or 7 blaster.

Note: See ch. Comm 5 for blaster license requirements and classifications.

(3) NOTIFICATIONS. Any person conducting blasting operations in a community shall notify the department, the local fire department and the local law enforcement agency of the date and location of the blasting operation. Notification to the department shall be made on forms provided by the department.

Note: Copies of the notice of blasting in a community (form SBD−7336) are available at no charge from the Safety and Buildings Division, P.O. Box 7302, Madison, WI 53707, telephone 608/266−8577.

History: Cr. Register, April, 1985, No. 352, eff. 5−1−85; am. (1) and (3), Register, October, 1999, No. 526, eff. 11−1−99; **CR 01−150: r. (2) Register May 2002 No. 557, eff. 6−1−02.**

Comm 7.36 Precautions after blast. (1) FUMES. Blast areas shall not be re−entered after firing until concentrations of smoke, dust and fumes have been reduced to safe limits as determined by the blaster in charge.

(2) WAITING PERIOD. (a) When multiple cap and fuse shots are fired, the blaster shall determine the length of the waiting period before any person is permitted in the blast area. When a misfire is known or suspected when using cap and fuse, no person may enter the area for at least one hour.

(c) When using electric detonators, shock tube or detonating cord systems and a misfire is known or suspected, no person other than the blaster in charge may enter the area for at least 15 minutes.

(d) Before resuming operations, the blaster in charge shall examine the area for misfired shots and unexploded or burning explosive materials. In case burning explosive materials are observed, no attempt may be made to extinguish them and persons shall retire to a safe place and remain there at least one hour.

(3) HANDLING MISFIRES. The handling of misfires shall be attempted only by blasters thoroughly experienced with this work. Whenever a blaster experienced with handling misfires is not available, the manufacturer shall be consulted for further advice.

History: Cr. Register, April, 1985, No. 352, eff. 5−1−85; am. (1), (2) (c) and (d), r. (2) (b), Register, October, 1999, No. 526, eff. 11−1−99.

Comm 7.37 Blasting log. (1) GENERAL. A blasting log shall be required for each blast fired.

(2) FILING AND AVAILABILITY. All blasting logs shall be kept on file by the blaster for a minimum period of 3 years, and shall be made available to the department upon request.

(3) INFORMATION. Each blasting log shall contain at least all of the following information:

(a) Name, signature and license number of the blaster in charge of the blast.

(b) Specific blast location, including address, bench and station number if applicable.

(c) Type of blasting operation.

(d) Date and time of the blast.

(e) Weather conditions at the time of the blast.

(f) Diagram of the blast layout and the delay pattern.

(g) Number of holes.

(h) Hole depth and diameter.

(i) Spacing.

(j) Burden.

(k) Maximum holes per delay.

(L) Maximum pounds of explosives per delay.

(m) Depth of top stemming used.

(n) Number, type and length of stemming used between decks.

(o) Total pounds and type of explosives used.

(p) Distance to nearest inhabited building not owned by the operator.

(q) Type of initiation used.

(r) Seismographic and airblast records, which shall include all of the following:

1. Type of instrument and last laboratory calibration date.
2. Exact location of instrument and the date, time, and distance from the blast.
3. Name of the person and firm taking the reading.
4. Trigger levels for ground and air vibrations.
5. The vibration and airblast levels recorded.

History: Cr. Register, April, 1985, No. 352, eff. 5−1−85; cr. (3) (p) and (q), Register, May, 1987, No. 377, eff. 6−1−87; r. and recr. (3), Register, October, 1999, No. 526, eff. 11−1−99.

Subchapter V — Manufacture of Explosive Materials

Comm 7.40 Manufacture of high explosives. High explosives manufacturing operations shall be conducted in accordance with methods approved by the department.

Note: High explosives manufacturing is regulated by the federal bureau of alcohol, tobacco and firearms under Title 27 CFR Part 55.

History: Cr. Register, April, 1985, No. 352, eff. 5−1−85.

Comm 7.41 Fixed location mixing of blasting agents. Buildings and other facilities used for mixing of blasting

agents at a fixed location shall comply with the requirements of this section.

(1) LOCATION OF MIXING PLANT. Plants for mixing blasting agents shall be isolated from inhabited buildings, passenger railroads and public highways in accordance with the Table of Distances for Storage of Explosives as specified in s. Comm 7.218. Separation distances for ammonium nitrate and blasting agents from explosives or blasting agents shall be in accordance with s. Comm 7.22.

(2) FUEL STORAGE. All fuel storage facilities shall be separated from the mixing plant and diked in a manner to contain the tank contents in case of rupture.

Note: See ch. Comm 10 for complete requirements pertaining to flammable and combustible liquids.

(3) LAYOUT OF MIXING PLANT. The layout of the mixing plant shall provide separation between the raw ammonium nitrate, manufacturing operations, and the storage of finished product.

(4) MIXING PLANT CONSTRUCTION. (a) Mixing plants shall be constructed of noncombustible materials or of sheet metal on wood studs.

(b) The plant shall be properly vented with vents equipped with spark–arresting screens.

(c) The floor of the mixing plant shall be of concrete or of other approved nonabsorbent material.

(d) Floors shall have no drains or piping into which molten materials could flow and be confined during a fire.

Note: See chs. Comm 61 to 65 for complete building and heating, ventilating and air conditioning requirements. Complete requirements for automatic fire suppression systems are also contained in these chapters.

(5) MIXING PLANT HEAT. Heat for the mixing plant shall be provided from a source outside the building.

(6) ELECTRICAL EQUIPMENT. All electrical equipment located in the mixing plant shall conform with the requirements of ch. Comm 16 for installation in a hazardous area.

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85; corrections made under s. 13.93 (2m) (b) 7., Stats., Register, October, 1996, No. 490; am. (2) and (5), Register, October, 1999, No. 526, eff. 11–1–99.

Comm 7.42 Mobile mixing vehicles. (1) PROHIBITED USE. Mobile mixing vehicles shall not be used for mixing of blasting agents while on public highways.

Note: The use of mobile mixing vehicles on public highways is also regulated by the Wisconsin department of transportation under chs. Trans 325 to 328.

(2) VEHICLE CONSTRUCTION. (a) The body of the mixing vehicle shall be constructed of noncombustible materials.

(b) The vehicle shall be strong enough to carry the load without difficulty and shall be in good mechanical condition.

(4) VEHICLE OPERATION. (a) Motor vehicles transporting blasting agent materials shall be handled in a safe and careful manner.

(b) Vehicles transporting blasting agent materials shall be driven by competent drivers at least 21 years of age with a driver's license valid for the type of vehicle being driven. Drivers shall be familiar with all applicable federal, state and local regulations.

(c) No person may ride upon, drive, load or unload a vehicle transporting blasting agent materials while smoking or under the influence of intoxicants or drugs.

(d) When transporting detonators or other explosive materials, mobile mixing vehicles shall comply with subch. III.

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85; r. (3), Register, October, 1999, No. 526, eff. 11–1–99.

Comm 7.43 Blasting agent mixing equipment. (1) APPLICATION. The requirements of this section apply to both fixed and mobile mixing equipment.

(2) MIXER DESIGN. (a) The design of the blasting agent mixer shall minimize the possibility of frictional heating, compaction and especially confinement. All surfaces shall be accessible for easy cleaning.

(b) The frame of the mixer and all other permanently located handling equipment shall be electrically bonded together and connected to an effective electrical ground.

(c) All bearings and drive assemblies shall be mounted outside the mixer and protected against the accumulation of dust.

(d) Means shall be provided to prevent the flow of fuel oil to the mixer in case of fire. In gravity flow systems, an automatic spring–loaded shutoff valve with fusible link shall be installed.

(3) MIXER CONSTRUCTION. (a) Mixing and packaging equipment shall be constructed of materials which are compatible with ammonium nitrate and with the fuel being used in the blasting agent mix.

(b) Zinc, galvanized metals and copper shall not be used.

Note: Zinc and galvanized metals tend to promote and accelerate decomposition of ammonium nitrate. Copper causes corrosion problems in the presence of ammonium nitrate.

(4) MAINTENANCE. All mixing equipment and pumps shall be maintained in accordance with manufacturer's recommendations.

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85; renum. (1) and (2) to be (2) and (3), cr. (1) and (4), Register, October, 1999, No. 526, eff. 11–1–99.

Comm 7.44 Mixing plant operation. (1) HOUSEKEEPING. (a) The mixing and packaging equipment and areas shall be cleaned and maintained properly to prevent accumulation of raw ingredients and finished product. Discarded empty ammonium nitrate bags shall be disposed of daily in a safe manner.

Note: The corrosive and irritating effects of ammonium nitrate, fuel oil or other blasting agent ingredients should be recognized and corrective action taken where a need is indicated.

(b) The area surrounding the mixing and packaging operation shall be kept free of rubbish, dry grass, weeds or other combustible material for at least 25 feet in all directions.

(2) SMOKING AND OPEN FLAMES. Smoking, matches, spark–producing devices, firearms and open flames shall not be permitted inside of or within 100 feet of the mixing and packaging operation. Signs to this effect shall be posted at entrances to the mixing and packaging areas.

(3) REPAIRS AND ALTERATIONS. Welding or gas cutting operations shall not be permitted in the mixing or storage areas while any blasting agent or ammonium nitrate is present. The area shall be cleaned or washed free of all ammonium nitrate and blasting agent before any welding or gas cutting operations are started.

Note: Where feasible, equipment should be removed for repairs or alterations.

(4) PERSONNEL LIMITATIONS. Only persons essential to the mixing and packaging operation shall be allowed in the mixing and packaging area at any one time.

(5) PRODUCTION LIMITATIONS. No more than one day's production of blasting agent shall be permitted in the mixing and packaging area at any one time.

(6) LABELING. All cartridges, bags or other containers of blasting agents shall be labeled to indicate their contents. Ammonium nitrate bags shall not be re–used as containers for blasting agents unless they are clearly relabeled so that no mistake can be made regarding their contents.

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85; r. and recr. (4), Register, October, 1999, No. 526, eff. 11–1–99.

Comm 7.45 Blasting agent composition. (1) LIQUID FUELS. (a) No liquid fuel with a flash point lower than 125° Fahrenheit may be used in the blasting agent mix.

Note: More volatile fuels such as gasoline offer no significant advantages in blasting and tend to increase the possibility of a vapor explosion and fire.

(b) Unless otherwise approved by the department, crude oil and crankcase drainings shall not be used in the blasting agent mix. The department will approve the use of crankcase drainings if the use has been approved by the federal mine safety and health administration and the use complies with ch. NR 679.

Note: Crude oil and crankcase drainings may contain low flashpoint constituents or gritty particles which could increase the sensitivity of the blasting agent.

History: Cr. Register, April, 1985, No. 352, eff. 5–1–85; am. (1), r. (2) to (5), Register, October, 1999, No. 526, eff. 11–1–99; **correction in (1) (b) made under s. 13.93 (2m) (b) 7., Stats.**

Subchapter VII — Blasting Resultants

Comm 7.60 Regulation of blasting resultants. Pursuant to s. 101.15 (2) (e), Stats., the purpose of this subchapter is to provide for the establishment of uniform limits on permissible levels of blasting resultants to reasonably assure that blasting resultants do not cause injury, damage or unreasonable annoyance to persons or property outside any controlled blasting site area.

History: Cr. Register, May, 1987, No. 377, eff. 6–1–87.

Comm 7.61 Preblasting notification. (1) PREBLASTING SURVEY. At least 24 hours prior to initial blasting at a blast site, the blaster in charge shall make a reasonable effort to notify in writing or verbally all residents or owners of affected dwellings or other structures, as determined under sub. (2), that a blasting operation is to begin. The blaster in charge shall offer to perform a preblasting survey for the residents or owners. If a resident or owner requests a copy of the preblasting survey, the blaster in charge shall provide a copy for not more than the actual cost of the copy within 48 hours of the request.

Note: A preblasting survey provides a baseline record of the pre–existing condition of a structure against which the effects of blasting can be assessed, and it should include the interior and exterior of the dwelling. While striving to minimize airblast, flyrock and ground vibrations, the blaster should inform local residents of the need for and the importance of blasting. A preblasting survey increases communications between the public and the blaster, helps the blaster to maintain good community relations, and is in the best interest of the owner and the blaster.

(2) AFFECTED BUILDINGS. Affected dwellings or other structures shall be determined based on the scaled–distance equation, $W = (D/Ds)^2$. Using a scaled–distance factor Ds of 55, affected dwellings or other structures shall be those located within the distance D of the controlled blasting site area for the weight per delay W of explosives to be used.

Note: An example calculation to determine D is as follows: For 4 pounds of explosives, $D = Ds(W)^{1/2} = 55\ (4)^{1/2} = 110$ feet.

History: Cr. Register, May, 1987, No. 377, eff. 6–1–87; correction made under s. 13.93 (2m) (b) 7., Stats., Register, October, 1996, No. 490.; r. and recr., Register, October, 1999, No. 526, eff. 11–1–99.

Comm 7.62 Blasting schedules. All surface blasting shall be conducted between sunrise and sunset, unless:

(1) More restrictive time periods are specified by the department; or

(2) Nighttime blasting is approved by the department based on a showing by the operator that the public will not be adversely affected by noise and other impacts.

History: Cr. Register, May, 1987, No. 377, eff. 6–1–87.

Comm 7.63 Instrumentation. All seismographs used for compliance with this subchapter shall meet the following minimum specifications:

(1) Seismic frequency range: 2 to 200 Hz (±3 Hz).

(2) Acoustic frequency range: 2 to 200 Hz (±1 dB).

(3) Velocity range: 0.02 to 4.0 inches/second.

(4) Sound range: 110 to 140 dB linear.

(5) Transducers: Three mutually perpendicular axes.

(6) Recording: Provide time–history of waveform.

(7) Calibration: Be laboratory calibrated as often as necessary, but at least once every 12 months according to manufacturer's recommendations.

History: Cr. Register, May, 1987, No. 377, eff. 6–1–87.

Comm 7.64 Control of adverse effects. (1) GENERAL REQUIREMENTS. Blasting shall be conducted so as to prevent injury and unreasonable annoyance to persons and damage to public or private property outside the controlled blasting site area.

(2) FLYROCK. Flyrock travelling in the air or along the ground:

(a) Shall remain within the controlled blasting site area; and

(b) Shall not be cast from the controlled blasting site area more than one–half the distance to the nearest inhabited building within or outside of the controlled blasting site area.

(3) AIRBLAST. (a) Airblast shall not exceed a maximum limit of 133 peak dB at the location of any dwelling, public building or place of employment outside the controlled blasting site area.

(b) The blaster shall conduct monitoring of every blast to ensure compliance with the airblast limit. The measuring system used shall have a lower–end flat frequency response of not more than 2 Hz and an upper–end flat frequency response of at least 200 Hz.

(4) GROUND VIBRATION. (a) 1. The maximum ground vibration at the location of any dwelling, public building or place of employment outside the controlled blasting site area shall be established in accordance with either the blasting–level chart of par. (b) or by the department under sub. (5).

2. All structures in the vicinity of the controlled blasting site area, not listed in subd. 1., such as water towers, pipelines and other utilities, tunnels, dams, impoundments and underground mines, shall be protected from damage by establishment by the blaster of a maximum allowable limit on the ground vibration. The blaster shall establish the limit after consulting with the owner of the structure.

(b) The blaster shall use the ground vibration limits specified in Figure 7.64 to determine the maximum allowable ground vibration. Ground vibration shall be measured as the particle velocity. Particle velocity shall be recorded in 3 mutually perpendicular directions.

(c) The blaster shall make and keep a seismograph record including both particle velocity and vibration frequency levels for each blast. The method of analysis shall be subject to discretionary review by the department.

(d) For quarry operations, the blaster shall report any ground vibration levels to the department that are above 0.75 inch per second with frequencies less than 40 Hz.

(5) EXCEPTIONS. (a) The maximum ground vibration and airblast standards of subs. (3) and (4) shall not apply within the controlled blasting site area.

(b) If necessary to ensure that blasting resultants at a particular blast area do not cause injury, damage or unreasonable annoyance to persons or property outside any controlled blasting site area, more restrictive limits shall be established by the department.

Note: Local municipalities may have more restrictive regulations than the department.

History: Cr. Register, May, 1987, No. 377, eff. 6–1–87; renum. (2) and (3) to be (3) and (2) and am. (2) (b), r. and recr. (3), (4), am. (5), Register, October, 1999, No. 526, eff. 11–1–99.