NFPA No.

495

MANUFACTURE, TRANSPORTATION, STORAGE, AND USE OF EXPLOSIVE MATERIALS 1972

$1.50

NATIONAL FIRE PROTECTION ASSOCIATION
International
60 Batterymarch Street, Boston, Mass. 02110

5M-6-72-FP
Printed in U.S.A.

Official NFPA Definitions

Adopted Jan. 23, 1964: Revised Dec. 9, 1969. Where variances to these definitions are found, efforts to eliminate such conflicts are in process.

SHALL is intended to indicate requirements.

SHOULD is intended to indicate recommendations or that which is advised but not required.

APPROVED means acceptable to the authority having jurisdiction. The National Fire Protection Association does not approve, inspect or certify any installations, procedures, equipment or materials nor does it approve or evaluate testing laboratories. In determining the acceptability of installations or procedures, equipment or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure or use. The authority having jurisdiction may also refer to the listings or labeling practices of nationally recognized testing laboratories,* i.e., laboratories qualified and equipped to conduct the necessary tests, in a position to determine compliance with appropriate standards for the current production of listed items, and the satisfactory performance of such equipment or materials in actual usage.

*Among the laboratories nationally recognized by the authorities having jurisdiction in the United States and Canada are the Underwriters' Laboratories, Inc., the Factory Mutual Research Corp., the American Gas Association Laboratories, the Underwriters' Laboratories of Canada, the Canadian Standards Association Testing Laboratories, and the Canadian Gas Association Approvals Division.

LISTED: Equipment or materials included in a list published by a nationally recognized testing laboratory that maintains periodic inspection of production of listed equipment or materials, and whose listing states either that the equipment or material meets nationally recognized standards or has been tested and found suitable for use in a specified manner.

LABELED: Equipment or materials to which has been attached a label, symbol or other identifying mark of a nationally recognized testing laboratory that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling is indicated compliance with nationally recognized standards or tests to determine suitable usage in a specified manner.

AUTHORITY HAVING JURISDICTION: The organization, office or individual responsible for "approving" equipment, an installation, or a procedure.

Statement on NFPA Procedures

This material has been developed in the interest of safety to life and property under the published procedures of the National Fire Protection Association. These procedures are designed to assure the appointment of technically competent Committees having balanced representation from those vitally interested and active in the areas with which the Committees are concerned. These procedures provide that all Committee recommendations shall be published prior to action on them by the Association itself and that following this publication these recommendations shall be presented for adoption to the Annual Meeting of the Association where anyone in attendance, member or not, may present his views. While these procedures assure the highest degree of care, neither the National Fire Protection Association, its members, nor those participating in its activities accepts any liability resulting from compliance or noncompliance with the provisions given herein, for any restrictions imposed on materials or processes, or for the completeness of the text.

Code for the Manufacture, Transportation, Storage, and Use of Explosive Materials

NFPA No. 495 — 1972

1972 Edition of No. 495

The 1972 edition is a complete revision of the 1970 edition and was prepared by the Sectional Committee on Explosives. It supersedes all previous editions.

Origin and Development of No. 495

This Code, prepared by the NFPA Committee on Chemicals and Explosives, was first adopted on July 13, 1959 by the NFPA Board of Directors on authorization of the Annual Meeting of that year. Following reorganization of the committee in 1960, the Sectional Committee on Explosives was assigned responsibility for the development and maintenance of NFPA recommendations on the manufacture, transportation, storage, and use of explosives and blasting agents. The Sectional Committee reports to the Association through the Correlating Committee of the Committee on Chemicals and Explosives. Amendments to No. 495 were adopted in 1962, 1965, 1967, 1968 (editorial change), 1969 and 1970, and a complete revision was adopted in 1972.

Committee on Chemicals and Explosives

Correlating Committee

Dr. Robert W. Van Dolah, *Chairman,*
Safety Research Center, Bureau of Mines, U. S. Department of the Interior, 4800 Forbes Ave., Pittsburgh, Pa. 15213

Chester I. Babcock†, *Secretary,*
National Fire Protection Assn., 60 Batterymarch St., Boston, Mass. 02110

W. H. Doyle, Factory Insurance Assn.
Thomas E. Duke, Fire Prevention & Engineering Bureau of Texas.
Dr. Richard Y. Le Vine, Olin Corp.
Henry T. Rittman, Institute of Makers of Explosives.
Richard F. Schwab, Allied Chemical Corp.
Russell H. Scott, Battelle-Northwest.

SCOPE: This committee serves as a policy-making and correlating group to administer and process reports of the various sectional committees dealing with chemicals and explosives.

Sectional Committee on Explosives

Henry T. Rittman, Jr., *Chairman,*
E. I. duPont de Nemours & Co., 12426 Nemours Bldg., Wilmington, Del. 19898
(rep. Institute of Makers of Explosives)

Chester I. Babcock,† *Secretary,*
National Fire Protection Association, 60 Batterymarch Street, Boston, Mass. 02110

Dr. Glenn H. Damon, U. S. Bureau of Mines
R. M. Graziano, Bureau of Explosives, Association of American Railroads
A. S. Hill, Sporting Arms and Ammunition Manufacturers' Institute
Rex Jordan, Fire Marshals Assn. of North America
Floyd E. Ouellette, Manufacturing Chemists' Assn.
Samuel J. Porter, Arlington, Va.
James D. Reilly, American Mining Congress
Edward C. Sabin, Factory Insurance Assn.
Jack C. Sanders, Fire Marshals Assn. of North America
Carroll E. Shaw, New Haven, Conn.
Dr. William J. Taylor, Institute of Makers of Explosives
Dr. Robert W. Van Dolah, U. S. Bureau of Mines
W. J. Welsh, Munitions Carriers Conference, Inc.

Alternate.

C. W. Schultz, Bureau of Explosives, Association of American Railroads (Alternate to R. M. Graziano)

SCOPE: Responsible for protecting against the fire and life hazards of explosives and related materials during their manufacture, storage, transportation and use except that the sale and use of fireworks and model rockets are the responsibility of the Pyrotechnics Committee.

†Nonvoting.

Code for the Manufacture, Transportation, Storage, and Use of

Explosive Materials

CONTENTS

Code for the Manufacture, Transportation, Storage, and Use of Explosive Materials

NFPA No. 495—1972

FOREWORD

This Code is intended to provide reasonable safety in the manufacture, storage, transportation, and use of explosive materials of the type where common usage is incidental to mining, quarrying, road building, harbor improvement, and similar operations, including their usage on farms. Special provisions are included to cover small arms ammunition, smokeless propellants, black powder propellants and primers, and industrial propellant- and explosive-actuated devices. It is also intended to cover the storage and use of explosive materials in industrial laboratories and laboratories of technical institutions, colleges and universities.

This Code is recommended for adoption as city and state regulations to promote safety and security in manufacture, transportation, storage, and use of explosives and blasting agents. Uniform regulations nationwide offer many advantages to governmental agencies, industry, fire services, and others.

Regulations of certain governmental agencies of the United States, such as the Department of Transportation, are referenced in this Code. The Code can be adapted for use in Canada by substitution of the names of the corresponding Canadian agencies. Similar adaptations for use in other countries can be made.

Explosives are acceptable articles of commerce when properly stabilized, packaged, and marked in accordance with the regulations of the U. S. Department of Transportation and when handled with specified care. Appendix A contains a partial list of explosives which are forbidden and unacceptable for transportation by common carriers.*

Regulations of the United States Coast Guard apply to facilities for the handling and storage of explosives incidental to shipment by water.**

*See Appendix A21.

**See Appendix A31.

Explosive materials present a definite hazard when improperly handled or when involved in a fire, collisions, and similar emergencies, especially to personnel of the fire and police departments who may be called upon for assistance, thus making the application of good practices all the more important.

Reasonable and intelligent application and proper enforcement of recognized safe practices can best be effected when the authorities having jurisdiction have readily available authoritative data covering the commodities to be safeguarded. Following is a list of sources of published information and advisory services.

American Insurance Association
85 John Street
New York, N. Y. 10038

Bureau of Explosives
Association of American Railroads
American Railroads Building
1920 L Street, N. W.,
Washington, D.C. 20036

Bureau of Mines
U. S. Department of the Interior
Washington, D. C. 20240

Institute of Makers of Explosives
420 Lexington Avenue
New York, N. Y. 10017

Internal Revenue Service
Alcohol, Tobacco and Firearms Division
U.S. Department of the Treasury
1111 Constitution Avenue, N.W.
Washington, D. C. 20240

Manufacturing Chemists' Association, Inc.
1825 Connecticut Ave., N.W.
Washington, D. C. 20009

Munitions Carriers Conference of the American Trucking Associations, Inc.
1616 P Street, N.W.
Washington, D. C. 20036

National Cargo Bureau, Inc.
99 John Street
New York, N. Y. 10038

National Fire Protection Association
60 Batterymarch Street
Boston, Mass. 02110

National Rifle Association of America
1600 Rhode Island Avenue, N.W.
Washington, D. C. 20036

Sporting Arms & Ammunition Manufacturers' Institute
420 Lexington Avenue
New York, N. Y. 10017

United States Coast Guard
Washington, D. C. 20226

U. S. Department of Transportation
Washington, D. C. 20591

U. S. Government Printing Office
Washington, D. C. 20402

CHAPTER 1. SCOPE AND DEFINITIONS

11. Scope

111. This Code shall apply to the manufacture, keeping, storage, sale, transportation, and use of explosive materials and some pyrotechnics.

112. It shall not apply to the transportation of explosive materials when under the jurisdiction of and in compliance with the regulations of the Hazardous Materials Regulation Board of the U. S. Department of Transportation (DOT). It shall, however, apply to state and municipal supervision as to compliance with Federal regulations within the jurisdiction of a state or a municipality.

113. It shall not apply to the transportation and use of military explosives by Federal and state military departments nor to the transportation and use of explosive materials by Federal, state, and municipal governmental departments while in the normal and emergency performance of their duties.

114. It shall not apply to the manufacture under the regulations of the Department of Defense of explosive materials for, or their distribution to or storage or possession by, the military or naval services or other agencies of the United States; or to arsenals, navy yards, depots or other establishments owned by, or operated by or on behalf of the United States.

115. It shall not apply to pyrotechnics commonly known as fireworks.*

116. It shall not apply to the use of explosive materials in medicines and medicinal agents in the forms prescribed by the United States Pharmacopeia, or the National Formulary.

117. The authority having jurisdiction may authorize alternate provisions to those in this Code to meet unusual conditions if the alternate provisions give substantially equivalent degrees of safety and security.

12. Definitions

121. In this Code the following words are used as defined below:

Approved. Shall mean approved by the authority having jurisdiction.

---

* See Appendix A43.

BLASTING AGENT. Shall mean any material or mixture, consisting of a fuel and oxidizer, intended for blasting, not otherwise classified as an explosive and in which none of the ingredients are classified as an explosive, provided that the finished product, as mixed and packaged for use or shipment, cannot be detonated by means of a No. 8 test blasting cap when unconfined.

NOTE: A No. 8 test blasting cap is one containing 2 grams of a mixture of 80% mercury fulminate and 20% potassium chlorate, or a cap of equivalent strength.

BULLET-RESISTANT. When used in reference to the construction of a magazine, bullet-resistant means that the side walls and doors of a magazine are resistant to penetration of a 150 grain full metal case projectile fired from a standard .30-06 caliber rifle having a nominal muzzle velocity of 2,700 feet per second. The bullet shall be fired at right angles to the side walls or doors from a distance of between 75 and 100 feet. Examples of constructions that meet this definition are given in Chapter 3. If tests are to be conducted to determine bullet resistance, test panels or empty magazines must be used.

When the ceiling of a magazine is required to be bullet-resistant, the ceiling is constructed to withstand penetration of a bullet described in the preceding paragraph when fired at an angle of 45 degrees from the perpendicular.

COMPOSITE PROPELLANTS. Shall mean a mixture consisting essentially of an elastomeric type fuel and an oxidizing material.

NOTE: Composite propellants are used in gas-generators and rocket motors.

DETONATOR. Shall mean any device containing a detonating charge that is used for initiating detonation of an explosive. The term includes but is not limited to, electric blasting caps of instantaneous and delay types, blasting caps for use with safety fuses and detonating-cord delay connectors.

EXPLOSIVE-ACTUATED POWER DEVICES. Shall mean any tool or special mechanized device which is actuated by explosives, but not to include propellant-actuated power devices. Examples of explosive-actuated power devices are jet tappers and jet perforators.

EXPLOSIVE. Shall mean any chemical compound, mixture, or device, the primary or common purpose of which is to function by explosion. The term includes, but is not limited to, dynamite, black powder, pellet powder, initiating explosives, detonators, safety fuses, squibs, detonating cord, igniter cord, and igniters.

NOTE 1: A list of explosives determined to be within the coverage of 18 U.S.C., Chapter 40, Importation, Manufacture, Distribution and Storage of Explosive Materials is issued at least annually by the Director of the Alcohol, Tobacco, and Firearms Division of the Internal Revenue Service of the Department of the Treasury.

NOTE 2: Classification of explosives described in the regulations of the U. S. Department of Transportation is as follows:

Class A Explosives. Possessing, detonating or otherwise maximum hazard; such as dynamite, desensitized nitroglycerin, lead azide, fulminate of mercury, black powder, blasting caps, and detonating primers.

Class B Explosives. Possessing flammable hazard, such as propellant explosives (including some smokeless propellants) and photographic flash powders.

Class C Explosives. Includes certain types of manufactured articles which contain Class A or Class B explosives, or both, as components but in restricted quantities.

Forbidden or Not Acceptable Explosives. Shall mean explosives which are forbidden or not acceptable for transportation by common carriers by rail freight, rail express, highway, or water in accordance with the regulations of the U. S. Department of Transportation.

NOTE 3: Certain chemicals and certain fuel materials may have explosive characteristics but are not specifically classified as explosives by the U. S. Department of Transportation and are not classified for coverage in this Code. Authoritative information should be obtained for such materials and action commensurate with their hazards, location, isolation and safeguards, should be taken.

EXPLOSIVE MATERIAL. Shall mean explosives, blasting agents, water gels (slurries), and detonators.

FUEL. Shall mean a substance that may react with the oxygen in the air or with the oxygen yielded by an oxidizer to produce combustion.

HIGHWAY. Shall mean any public street, public alley or public road.

INHABITED BUILDINGS. Shall mean a building or structure regularly used in whole or part as a place of human habitation. The term "inhabited building" shall also mean any church, school, store, railway passenger station, airport terminal for passengers, and any other building or structure where people are accustomed to congregate or assemble, but excluding any building or structure occupied in connection with the manufacture, transportation, storage and use of explosive materials.

MAGAZINE. Shall mean any building or structure, other than an explosives manufacturing building, approved for the storage of explosives.

MOTOR VEHICLE. Shall mean any self-propelled vehicle, truck, tractor, semitrailer, or truck-full trailer used for the transportation of freight over public highways.

NITRO-CARBO-NITRATE. Shall mean any blasting agent that has been classified as nitro-carbo-nitrate under the U. S. Department of Transportation regulations, and that is packaged and shipped in compliance with the regulations of the U. S. Department of Transportation.

OXIDIZER. Shall mean a substance such as a nitrate that yields oxygen readily to stimulate the combustion of organic matter or other fuel.

PERSON. Shall mean any individual, firm, copartnership, corporation, company, association, joint stock association, and including any trustee, receiver, assignee or personal representative thereof.

PROPELLANT. Shall mean an explosive that normally functions by deflagration and is used for propulsion purposes. It may be a Class A or a Class B explosive, depending on its susceptibility to detonation. Black powder includes black powder propellant.

PROPELLANT-ACTUATED POWER DEVICES. Shall mean any tool or special mechanized device or gas generator system which is actuated by a propellant or which releases and directs work through a propellant charge.

PUBLIC CONVEYANCE. Shall mean any railroad car, streetcar, ferry, cab, bus, airplane or other vehicle which is carrying passengers for hire.

PYROTECHNICS. Shall mean and include any combustible or explosive compositions or manufactured articles designed and prepared for the purpose of producing audible or visible effects. The term also includes fireworks, which are not covered by this Code.

RAILWAY. Shall mean any steam, electric, diesel electric or other railroad or railway which carries passengers for hire on the particular line or branch in the vicinity where explosives are stored or where explosives manufacturing buildings are situated.

SEMICONDUCTIVE HOSE. Shall mean a hose with an electrical resistance high enough to limit flow of stray electric currents to safe levels yet not so high as to prevent drainage of static electric charges to ground; hose of not more than 2 megohms resistance over its entire length and of not less than 5,000 ohms per foot meets the requirement.

SINGULAR AND PLURAL. Words used in the singular number shall include the plural and in the plural the singular.

SMALL ARMS AMMUNITION. Shall mean any shotgun, rifle, pistol or revolver cartridge, and cartridges for propellant-actuated power devices and industrial guns. Military-type ammunition containing explosive bursting charges, incendiary, tracer, spotting or pyrotechnic projectiles is excluded from this definition.

SMALL ARMS AMMUNITION PRIMERS. Small percussion-sensitive explosive charges, encased in a cap, used to ignite propellant powder.

SMOKELESS PROPELLANTS. Solid propellants, commonly called smokeless powders in the trade, used in small arms ammunition, cannon, rockets, propellant-actuated power devices, etc.

SPECIAL INDUSTRIAL EXPLOSIVES DEVICES. Shall mean explosive-actuated power devices and propellant-actuated power devices.

SPECIAL INDUSTRIAL EXPLOSIVES MATERIALS. Shall mean shaped materials and sheet forms and various other extrusions, pellets and packages of high explosives, which include dynamite, TNT,* PETN*, RDX,* and other similar compounds used for high-energy-rate forming, expanding and shaping in metal fabrication, and for dismemberment and quick reduction of scrap metal.

WATER GELS (Slurries). Shall mean any of a wide variety of materials used for blasting that contain substantial proportions of water and high proportions of ammonium nitrate, some of which is in solution in the water. Two broad classes of water gels are (a) those which are sensitized by a material classed as an explosive, such as TNT or smokeless powder, and (b) those which contain no ingredient classified as an explosive; these are sensitized with metals such as aluminum or with other fuels. Water gels may be premixed at a plant or mixed at the site immediately before delivery into the borehole.

NOTE: Water gels are manufactured to have varying degrees of sensitivity to initiation. Under the regulations of the U. S. Department of Transportation, water gels may be classified as Explosives Class A, Propellant Explosives Class B, or Oxidizing Materials.

* Trinitrotoluene, pentaerythritoltetranitrate, cyclotrimethylenetrinitramine.

CHAPTER 2. SECURITY AND SAFETY OF EXPLOSIVE MATERIALS

21. General Provisions

211. The manufacture of any explosive materials as herein defined, shall be prohibited within (name of city, county, state, or other area) unless such manufacture is authorized by Federal license and is conducted in accordance with recognized safe practices. This shall not apply to hand loading of small arms ammunition prepared for personal use and not for resale.

212. The manufacture of explosive materials within (name of city, county, state, or other area) shall be prohibited when such manufacture presents an undue hazard to life and property.

213. The authority having jurisdiction may restrict the quantity of explosive materials that may be handled at any location within (name of city, county, state, or other area).

214. All explosive materials and any newly developed and unclassified explosive materials shall meet the license and permit requirements of this chapter. This shall not be construed as applying to stocks of small arms ammunition and components thereof, to the extent that they are covered by the provisions of the Gun Control Act of 1968 (Title 18, Chapter 44, U. S. Code).

215. Persons intending to engage in business as an importer or manufacturer of, or dealer in, explosive materials shall obtain a Federal license in accordance with Title XI, Regulation of Explosives, of the Organized Crime Control Act of 1970 (18 U.S.C., Chapter 40).

216. This chapter is intended to supplement existing Federal laws and regulations. Therefore, any person who possesses a license or permit under Title XI of the Organized Crime Control Act of 1970 (18 U.S.C., Chapter 40) properly covering the activities of such person shall not be required to obtain a permit under this chapter.

22. Permit Requirements

221. No person shall be in possession of explosive materials or conduct an operation or activity requiring the use of explosive materials or perform or supervise the loading and firing of explosive materials without first obtaining the proper permit.

222. Explosive materials shall not be sold, given, delivered, or transferred to any person not in possession of a valid permit.

223. Every person conducting an operation or activity requiring the use of explosive materials (1) shall obtain a permit to use explosive materials and shall be responsible for the results and any other consequences of any loading or firing of explosive materials; and (2) shall make sure that such loading and firing are performed or supervised by a person possessing a permit to blast. Laboratories engaged in testing explosive materials, other than when conducting test blast explosions, require only a Permit to Use.

23. Permit Classes

231. Permit to Use. Before a person may conduct an operation or activity that requires the use of explosive materials he shall obtain a Permit to Use, which authorizes him to purchase, possess, store, and use such materials.

232. Permit to Blast. Before an individual may supervise and perform the loading and firing of explosive materials he shall obtain the appropriate Permit to Blast from the following Classes:

Class	Category	Blasting Permitted
A	Unlimited	All types of blasting.
B	General aboveground	All phases of blasting operations in quarries, open pit mines, aboveground construction.
C	General underground	All phases of blasting operations in underground mines, shafts, tunnels, and drifts.
D	Demolition	All phases of blasting in demolition projects.
E	Seismic prospecting	All phases of blasting in seismic prospecting.
F	Agriculture	All phases of blasting in agriculture but limited to not more than 50 pounds per blast.
G	Special	Special blasting as described on the permit.

24. Blasters Permit

241. The applicant for an initial permit to supervise and perform the loading and firing of explosive materials as required in

Section 232 shall demonstrate that he has had adequate training and experience in the use of explosive materials in any class authorized by the permit applied for; and shall pass a qualifying examination. The examination may be written, oral or by such other means as necessary to determine that the applicant is competent to conduct blasting operations and to perform the duties of a blaster.

242. Any holder of a Permit to Blast who is convicted of a violation of any explosives law or regulation shall be required to pass a qualifying examination as a condition to the retention of his permit.

243. Any person whose Permit to Blast has been revoked shall be required to pass a qualifying examination before the permit is reinstated.

244. Any person whose permit has lapsed for a period of one year or more shall be required to pass a qualifying examination before renewal.

25. Posting of Permits

251. Permit to Use. A copy shall be posted at each place of operation.

252. Permit to Blast. A copy shall be carried by the permit holder during blasting operations.

253. Permit holders shall take every reasonable precaution to protect their permits from loss, theft, defacement, destruction or unauthorized duplication, and any such occurrence shall be reported immediately to the issuing authority.

26. Permit Restrictions

261. No permit may be assigned or transferred.

262. No natural person under twenty-one years shall be issued a permit.

263. Permits shall be dated, numbered, and be valid for no more than three years from the date of issue.

27. Denial or Revocation of Permits

271. A permit for the possession and use of explosive materials may be denied or revoked for any of the following reasons:

1. Noncompliance with any order of the issuing authority within the time specified in such order.

2. Proof that the permit applicant or holder is under indictment for, or has been convicted of a crime punishable by imprisonment for a term exceeding one year.
3. The applicant is a fugitive from justice.
4. The applicant is an unlawful user of, or is addicted to narcotics or dangerous drugs.
5. The applicant has been adjudicated as a mental defective.
6. Proof that the permit applicant or holder advocates, or knowingly belongs to any organization or group that advocates violent overthrow of or violent action against any Federal, state or local government.
7. Proof that the permit applicant or holder suffers from a mental or physical defect that would interfere with the applicant's safe handling of explosives.
8. Violation by the permit applicant or holder of any provision of any explosives law or regulation; or proof that false information was given or a misrepresentation was made to obtain the permit.

272. In any case where the issuing authority denies or revokes a permit, it promptly will notify the applicant or permit holder. Said notice will set forth the specific basis for the denial or revocation and state that upon written request a hearing before the issuing authority will be held within ten days after the date of the request.

a. Promptly after such hearing the issuing authority shall state its findings and conclusions in writing and transmit a copy to the applicant or former permit holder.

273. Upon notice of the revocation of any permit the former permit holder shall immediately surrender to the issuing authority the revoked permit and all copies thereof.

28. Record Keeping and Reporting

281. A holder of a Permit to Use shall keep a record of all transactions or operations involving explosive materials for five years. Such record shall be made available to the issuing authority upon request.

282. An accumulation of invoices, sales slips, delivery tickets or receipts, or similar papers representing individual transactions will satisfy the requirement for records provided they include the signature of the receiver of the explosive materials.

283. A person holding a Permit to Blast shall keep a daily record of all explosive materials received and fired or otherwise disposed of by him. These records shall be retained by the person holding the Permit to Use in accordance with Section 281.

284. The issuing authority shall be notified promptly by any permit holder of a change in business address.

285. The loss, theft or unlawful removal of explosive materials shall be reported immediately to the Assistant Regional Commissioner, Alcohol, Tobacco and Firearms Division of the Internal Revenue Service of the appropriate district, to the issuing authority, and to the local law enforcement authority.

29. Applications and Renewals

291. Application for a permit or its renewal shall be made to the issuing authority on forms provided by it and shall contain such information as may be required.

292. If an application for renewal is filed with the issuing authority before the expiration of the old permit, the renewal will become effective when the old permit expires. No renewal permit shall be issued more than thirty days before the expiration date of the current permit.

293. If an application for renewal is filed after the expiration of the old permit, it shall be considered as an application for a new permit.

CHAPTER 3. ABOVEGROUND STORAGE OF EXPLOSIVE MATERIALS

31. General Provisions

311. Explosive materials shall be kept in magazines which meet the requirements of this chapter. This shall not be construed as applying to stocks of small arms ammunition, propellant-actuated power catridges, small arms ammunition primers in quantities of less than 750,000, and smokeless propellant in quantities of less than 800 pounds (see Chapter 9).

312. All explosive materials shall be kept in storage magazines unless they are:

1. in process of manufacture;
2. being used;
3. being transported.

313. Ammonium nitrate may be stored in the same magazine with blasting agents; and ammonium nitrate and blasting agents may be stored in the same magazine with explosives.

a. When ammonium nitrate is stored in the same magazine with blasting agents, the magazine shall be suitable for storage of blasting agents.

b. When ammonium nitrate is stored in the same magazine with explosives or explosives and blasting agents, the magazine shall be suitable for storage of explosives.

c. In determining the maximum quantity of explosive materials that may be placed in a magazine, one-half the weight of ammonium nitrate shall be added to the weight of explosive materials.

314. Detonators such as blasting caps, electric blasting caps and detonating primers shall be stored in a separate magazine for blasting supplies and shall not be stored in a magazine with other explosive materials.

315. Explosive materials that are cap-sensitive shall be stored in Types 1, 2 or 3 magazines, except that black powder may be stored in a Type 4 magazine or a magazine of higher classification (lower Type number).

316. Explosive materials that are not cap-sensitive shall be stored in Types 4 or 5 magazines.

317. Detonators shall be stored in Types 1, 2 or 3 magazines, except that electric blasting caps having leg wires at least four feet long may be stored in a Type 4 magazine.

318. Wherever specific types of magazines are required by this Code, magazines of higher classification (lower Type number) may be substituted.

32. Types of Magazines

321. Type 1 Magazine. A permanent magazine for the storage of explosive materials that are sensitive to initiation by a No. 8 test blasting cap and will mass detonate, such as dynamite and nonelectric blasting caps (see Section 324 for storage restrictions for electric blasting caps). Type 1 magazines are bullet-resistant, fire-resistant, theft-resistant, and weather-resistant.

322. Type 2 Magazine. A portable or mobile magazine for outdoor or indoor storage of explosive materials that are sensitive to initiation by a No. 8 test blasting cap and will mass detonate, such as dynamite or nonelectric blasting caps (see Section 324 for storage of electric blasting caps). Type 2 magazines are bullet-resistant, fire-resistant, theft-resistant, and weather-resistant except that magazines for indoor storage need not be bullet-resistant.

323. Type 3 Magazine. A portable magazine for the temporary storage of explosive materials while attended. An example is a "day box" at the site for blasting operations. Type 3 magazines are bullet-resistant, fire-resistant, theft-resistant, and weather-resistant.

324. Type 4 Magazine. A permanent, portable or mobile magazine for the storage of explosive materials that are not sensitive to initiation by a No. 8 test blasting cap such as blasting agents, certain water gels, smokeless powder, and black powder, or explosive materials that will not mass detonate such as electric blasting caps having leg wires at least four feet long. Type 4 magazines are fire-resistant, theft-resistant, and weather-resistant.

325. Type 5 Magazine. A permanent, portable or mobile magazine for the storage of explosive materials that are not sensitive to initiation by a No. 8 test blasting cap such as blasting agents and certain water gels. Type 5 magazines include tanks, tank trailers, tank trucks, semitrailers, bulk trailers, bulk trucks and bins. Type 5 magazines are theft-resistant and outdoor Type 5 magazines are also weather-resistant.

33. Location of Magazines

331. All outdoor magazines except Type 3 shall be located in compliance with the American Table of Distances for Storage of Explosives (Table A11) when determining minimum distance to inhabited buildings, passenger railways, and public highways.

332. Separation Distances in Tables A11, A12 or both shall be used when determining minimum separation of storage facilities for explosives, blasting agents, and ammonium nitrate. The Tables to be applied when determining separation distances for specific materials shall be as follows:

Stored Materials	Use Table(s)
Explosive, explosives	A11
Ammonium nitrate, explosives	A12
Ammonium nitrate, blasting agents	A12
Blasting agent, explosives	A11, A12*
Ammonium nitrate, blasting agents, explosives	A11, A12*

333. Type 2 and Type 4 indoor magazines shall be used for the storage of 50 pounds or less of explosive materials in warehouses and in wholesale and retail establishments. They shall be located on a floor which has an entrance at outside grade level and they shall be located not more than 10 feet from such an entrance. Two magazines may be located in the same building when one is used only for blasting caps and similar devices in quantities not in excess of 5,000 and when a distance of 10 feet is maintained between magazines. The local fire department shall be notified of the location of the magazines and of any change in their location.

334. Type 3 magazines shall be located away from neighboring inhabited buildings, railways, highways, and other magazines. A distance of 150 feet, or greater if required by the local authority having jurisdiction, shall be maintained between magazines and the work in progress when the quantity of explosives kept therein is in excess of 25 pounds, and at least 50 feet when the quantity of explosives is 25 pounds, or less.

335. A Type 3 magazine shall be attended when explosive materials are stored in the magazine, and at the end of the work day all explosive materials shall be removed to the appropriate storage magazines for unattended storage. Two Type 3 magazines may be located at the site of blasting operations when one magazine is used for blasting caps or electric blasting caps.

336. A Type 5 magazine shall not be located in a residence or dwelling.

34. Construction of Magazines — General

341. Magazines shall be constructed in conformity with the provisions of this chapter, or may be of substantially equivalent construction.

*Use the greatest distance of those shown in the Tables. Also see Note 2 of Table A12.

342. The ground around magazines shall be graded in such a manner that water will drain away from the magazine.

343. Magazines requiring heat shall be heated by either hot water radiant heating within the magazine building; or air directed into the magazine building over either hot water or low pressure steam (15 psig) coils located outside the magazine building.

344. The magazine heating systems shall meet the following requirements:

1. The radiant heating coils within the building shall be installed in such a manner that the explosive materials or their containers cannot contact the coils and air is free to circulate between the coils and the explosive materials or their containers.
2. The heating ducts shall be installed in such a manner that the hot air discharge from the duct is not directed against the explosive materials or their containers.
3. The heating device used in connection with a magazine shall have controls which prevent the ambient building temperature from exceeding 130° F.
4. The electric fan or pump used in the heating system for a magazine shall be mounted outside and separate from the wall of the magazine and shall be grounded.
5. The electric fan motor and the controls for electrical heating devices used in heating water or steam shall have overloads and disconnects, which comply with the National Electrical Code.* All electrical switch gear shall be located a minimum distance of 25 feet from the magazine.
6. The heating source for water or steam shall be separated from the magazine by a distance of not less than 25 feet when electrical and 50 feet when fuel-fired. The area between the heating unit and the magazine shall be cleared of all combustible materials.
7. The storage of explosive materials and their containers in the magazine shall allow uniform air circulation so temperature uniformity can be maintained throughout the explosive materials.

345. When lights are necessary inside the magazine, electric safety flashlights or electric safety lanterns shall be used.

---

* See Appendix A44.

a. The authority having jurisdiction may authorize interior lighting of special design for magazines provided that adequate safety is maintained.

346. The construction provisions of this chapter do not apply to storage magazines at an active manufacturing plant that has security gates and fencing; or at a magazine area that is operated continuously; or at a magazine area that is patrolled so that entry by intruders is unlikely and provided that the alternate types of construction and methods of operation of the magazine area provide substantially equivalent safety and security.

347. When ventilation is required in a magazine, sufficient ventilation shall be provided to protect the explosive materials in storage for the specific area in which the magazine is located. Explosive materials within a storage magazine shall be so placed as not to interfere with ventilation and shall be stored so as to prevent contact with masonry walls or with any steel or other ferrous metal by means of a nonsparking lattice or equivalent lining.

348. Except in a Type 5 magazine, there shall be no ferrous metal exposed on the interior of a magazine where it may come into contact with the packages of explosives.

35. Construction of Magazines

351. Type 1 Magazine. A Type 1 magazine shall be a permanent structure such as a building or an igloo that is bullet-resistant, fire-resistant, theft-resistant, weather-resistant, and ventilated.

a. Walls. The walls of a Type 1 magazine shall be bullet-resistant. Examples of wall constructions that are considered bullet-resistant are:

1. Hollow masonry block construction with 8-inch blocks having the hollow spaces filled with well-tamped dry sand or a well-tamped cement/sand mixture with not less than a 1 to 8 ratio of cement to sand.
2. Brick or solid cement block construction 8 inches thick.
3. Wood construction covered with 26 gauge metal having ¾-inch plywood or wood sheathing with a 6-inch space between the exterior and interior sheathing and the space between the sheathing filled with well-tamped dry sand or well-tamped cement/dry sand mixture with not less than a 1 to 8 ratio of cement to sand.
4. Fourteen-gauge metal construction lined with 4 inches of brick, solid cement block or hardwood; or walls filled with six inches of sand.

b. Doors. The doors of a Type 1 magazine shall be bullet-resistant. Examples of door construction that are considered bullet-resistant are:

1. Steel plate ⅜-inches thick lined with four layers of ¾-inch tongue and groove hardwood flooring.
2. Metal plate not less than 14 gauge lined with four inches of hardwood.

c. Roof. The roof of a Type 1 magazine shall be constructed of metal not less than 14 gauge; or ¾-inch wood sheathing covered by metal not less than 26 gauge or other noncombustible roofing material. All exposed wood on the exterior including the eaves shall be protected by metal not less than 26 gauge.

d. Ceiling. Where the natural terrain around a Type 1 magazine makes it possible to shoot a bullet through the roof at such an angle that a bullet could strike the explosives stored in the magazine, then either the roof or the ceiling shall be of bullet-resistant construction. A bullet-resistant ceiling may be constructed at the eave line, covering the entire area of the magazine except the space necessary for ventilation. Examples of ceiling construction that are considered bullet-resistant are:

1. A sand tray having a depth of not less than 4 inches of sand.
2. A hardwood ceiling not less than 4 inches thick.

e. Foundation. The foundation may be of masonry, wood, or metal and shall be completely enclosed except for openings to provide cross ventilation. A wooden foundation enclosure shall be covered on the exterior with not less than 26 gauge metal.

f. Floor. The floor may be constructed of wood or other suitable floor materials. Floors constructed of materials that may cause sparks shall be covered with a surface of nonsparking material or the packages of explosives shall be placed on pallets of nonsparking material. Magazines constructed with foundation ventilation shall have at least a 2-inch air space between the side walls and the edge of the floor.

g. Ventilation. Type 1 magazines shall be ventilated to prevent dampness and heating of stored explosives. Ventilating openings shall be screened to prevent the entrance of sparks. Ventilators in side walls shall be offset or shielded. 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 constructed a wooden lattice lining or equivalent to prevent the

packages of explosives from being stacked against the side walls and blocking the air circulation.

h. Locks. Each door of a Type 1 magazine shall be equipped with two mortise locks; or with two padlocks fastened in separate hasps and staples; or with a combination of mortise lock and a padlock; or with a mortise lock that requires two keys to open; or a three-point lock, or equivalent type of lock that secures a door to the frame at more than one point. Padlocks shall be steel having at least five tumblers and at least a 7/16-inch-diameter case-hardened shackle. All padlocks shall be protected by steel hoods that are installed in a manner to discourage insertion of bolt cutters. Doors that are secured by a substantial internal bolt do not require additional locking devices. Hinges and hasps shall be securely fastened to the magazine and all locking hardware shall be secured rigidly and directly to the door frame.

352. Type 2 Magazine. A Type 2 magazine shall be a portable or mobile structure, such as a box, skid-magazine, trailer or semi-trailer, that is fire-resistant, theft-resistant, weather-resistant, and ventilated. It shall also be bullet-resistant except when used for indoor storage.

a. Type 2 Outdoor Box Magazine

1. The sides, bottom, top and covers or doors shall be constructed of metal, lined with at least 4 inches of hardwood or equivalent bullet-resistant material. The floor shall be of wood or other suitable nonsparking floor materials. Floors constructed of ferrous metal shall be covered with a surface of nonsparking material. Magazines with top opening shall have a lid that overlaps the sides by at least 1 inch when in closed position.
2. Type 2 outdoor box magazine shall be supported in such a manner as to prevent the floor from having direct contact with the ground. Small magazines shall be securely fastened to a fixed object to prevent theft of the entire magazine.
3. Hinges, hasps, locks, and locking hardware shall conform to the provisions for Type 1 magazines as specified in paragraph 351(h).

b. Type 2 Vehicular Magazine

1. The sides and roof shall be not less than 20 gauge metal. The walls shall be lined with 4 inches of brick or solid cement block or hardwood, or 6 inches of sand, or other bullet-resistant material. The exposed interior walls may be lined with wood. The roof shall be protected by a bullet-resistant ceiling meeting the construction requirements for bullet-resistant ceilings in Paragraph 351(d).

2. The doors shall be of metal, lined with not less than 4 inches of hardwood, or a metal exterior with a hardwood inner door not less than 4 inches in thickness.
3. The floors shall be in accordance with the provisions for Type 1 magazines in Paragraph 351(f).
4. The doors shall be locked with at least two padlocks for each door opening, either two padlocks on the exterior door fastened on separate hasps and staples, or one padlock on the exterior door and one padlock on the interior door. The padlocks shall be steel having at least five tumblers and at least a 7/16-inch-diameter case-hardened shackle. The padlocks need not be protected by steel hoods. Hinges and hasps shall be securely fastened to the magazine and all locking hardware shall be secured rigidly and directly to the door frame. When unattended, a vehicular magazine shall have wheels removed, or be locked with a kingpin locking device, or otherwise be effectively immobilized.

c. Type 2 Cap Magazine

1. Storage facilities for blasting caps or similar explosive devices in quantities of 100 or less shall have sides, bottoms, and covers constructed of 12 gauge metal and lined with a nonsparking material. Hinges and hasps shall be attached thereto by welding. A single five-tumbler lock shall be sufficient for locking purposes. Cap magazines when used for outdoor storage of explosive materials other than caps or similar explosive devices shall be bullet-resistant.

d. Type 2 Indoor Magazine

1. An indoor Type 2 magazine shall be provided with substantial wheels or casters to facilitate removal from a building in an emergency. The cover for the magazine shall have substantial strap hinges and a means for locking. The magazine shall be kept locked except during the placement or removal of explosive materials with one five-tumbler padlock or equivalent.
2. Type 2 indoor magazines shall be painted red and shall bear lettering in white, on top, at least three inches high, "Explosives — Keep Fire Away."
3. Type 2 indoor magazines constructed of wood shall have sides, bottoms, and covers or doors constructed of 2-inch hardwood and shall be well braced at corners. The magazines shall be covered with sheet metal of not less than 20 gauge. Nails exposed to the interior of such magazines shall be countersunk.

4. Type 2 indoor magazines constructed of metal shall have sides, bottoms, and covers or doors constructed of 12-gauge metal and shall be lined inside with a nonsparking material. Edges of metal covers shall overlap sides at least 1 inch.

353. Type 3 Magazine. Type 3 magazines shall be a portable structure that is bullet-resistant, fire-resistant, theft-resistant, and weather-resistant.

a. Type 3 magazines shall be equipped with a five-tumbler padlock.

b. Type 3 magazines constructed of wood shall have sides, bottoms, and covers or doors constructed of 4-inch hardwood and shall be well braced at corners. They shall be covered with sheet metal of not less than 20 gauge. Nails exposed to the interior of such magazines shall be countersunk.

c. Type 3 magazines constructed of metal shall have sides, bottoms, and covers or doors constructed of 12-gauge metal and and shall be lined inside with a nonsparking material. Edges of metal covers shall overlap sides at least 1 inch.

354. Type 4 Magazine. A Type 4 magazine shall be a permanent portable, or mobile structure such as a building, igloo, box, semi-trailer, or other mobile container that is fire-resistant, theft-resistant, and weather-resistant.

a. Type 4 Outdoor Magazine

1. A Type 4 outdoor magazine shall be constructed of masonry, wood covered with metal, fabricated metal or a combination of these materials. The doors shall be metal or wood covered with metal. Permanent magazines shall be constructed in accordance with those provisions for Type 1 magazines pertaining to foundations (Paragraph 351(e)), ventilation (Paragraph 351(g)), and locks, hinges, hasps and locking hardware (Paragraph 351(h)). Vehicular Type 4 magazines shall be in accordance with the provisions for Type 2 Vehicular Magazines for locks, hinges, hasps and locking hardware (Paragraph 352(b)4) and shall be immobilized when unattended (Paragraph 352(b)2).

b. Type 4 Indoor Magazine

1. A Type 4 indoor magazine shall be in accordance with the provisions of a Type 2 indoor magazine (Paragraph 352(d)).

355. Type 5 Magazine. A Type 5 magazine shall be a permanent, portable or mobile structure such as a building, igloo, box,

bin, tank, semitrailer, bulk trailer, tank trailer, bulk truck, tank truck or other mobile container that is theft-resistant. No ventilation is required and ferrous metal need not be covered with nonsparking material.

a. Type 5 Outdoor Magazine

1. A Type 5 outdoor permanent magazine and tanks, bins, semitrailers, tank trucks or other mobile equipment used as a Type 5 outdoor magazine shall be weather-resistant and locked with at least one steel case five-tumbler padlock having at least a 7/16-inch-diameter case-hardened shackle. A hood for the padlock is not required. Hinges and hasps shall be securely fastened to the magazine and all locking hardware shall be secured rigidly and directly to the door frame. A vehicular Type 5 magazine when unattended shall be immobilized in accordance with the provisions for a Type 2 vehicular magazine (Paragraph 352(b)).

b. Type 5 Indoor Magazine

1. A Type 5 indoor magazine shall be constructed in accordance with the provisions for a Type 5 outdoor magazine except that it need not be weather-resistant.

36. Magazine Operations

361. Storage Within Magazines

a. Magazines shall be in the charge of a competent person at all times who shall be at least 21 years of age, and who shall be held responsible for the enforcement of all safety precautions.

b. All magazines containing explosive material shall be opened and inspected at intervals of not greater than three days to determine whether there has been an unauthorized entry or attempted entry into the magazines; or to determine whether there has been unauthorized removal of the magazines or the contents of the magazines.

c. Magazine doors shall be kept locked, except during the time of placement and removal of stocks of explosives or during inspection.

d. Safety rules covering the operations of magazines shall be posted on the interior of the magazine door.

e. When any explosive is removed from a magazine for use, the oldest stock shall be removed first.

f. Corresponding grades and brands shall be stored together in such a manner that brands and grade marks show. All stocks shall be stored so as to be easily counted and checked.

g. Containers of explosive materials shall be piled in a stable manner.

h. Containers of explosive materials shall be laid flat with top side up.

i. Black powder, when stored in magazines with other explosives, shall be stored separately. Black powder stored in kegs shall be stored on ends, bungs down, or on side, seams down.

j. Open containers of explosive materials shall be securely closed before being returned to a magazine. Only fiberboard containers may be opened in the magazine. No container without a closed lid may be stored in the magazine.

k. Wooden packages of explosive materials shall not be unpacked or repacked in a magazine nor within 50 feet of a magazine or in close proximity to other explosive materials.

l. Tools used for opening containers of explosive materials shall be constructed of nonsparking material, except that metal slitters may be used for opening fiberboard containers. A wood wedge and a fiber, rubber or wood mallet shall be used for opening or closing wood containers of explosives.

m. Magazines shall be used exclusively for the storage of explosive materials, blasting materials and blasting accessories. Metal tools other than nonferrous transfer conveyors shall not be stored in any magazine containing explosives or detonators. Ferrous metal conveyor stands may be stored in the magazine when the stands are protected by a coat of paint.

n. Magazine floors shall be regularly swept, kept clean, dry, free of grit, paper, empty used packages and rubbish. Brooms and other cleaning utensils shall not have any spark-producing metal parts. Sweepings from floors of magazines shall be disposed of in accordance with the instructions of the manufacturer.

o. When any explosive material has deteriorated to an extent that it is in an unstable or dangerous condition, or if nitroglycerin or other liquid leaks from any explosive, then the person in possession of such explosive shall immediately proceed to destroy such explosive in accordance with the instructions of the manufacturer. Only experienced persons shall do the work of destroying explosives.

p. Magazine floors stained with nitroglycerin or other liquid shall be cleaned in accordance with instructions by the manufacturer.

q. When magazines need interior repairs, all explosives shall be removed therefrom and the floors cleaned.

r. In making exterior magazine repairs, when there is a possibility of causing sparks or fire, the explosives shall be removed from the magazine.

s. Explosive materials removed from a magazine under repair shall either be placed in another magazine or placed a safe distance from the magazine, where they shall be properly guarded and protected until repairs have been completed. Upon completion of repairs, the explosive materials shall be promptly returned to the magazine.

362. Miscellaneous Safety Precautions.

a. Smoking, matches, open flames, spark-producing devices and firearms (except firearms carried by authorized guards) shall not be permitted inside of or within 50 feet of magazines.

b. The land surrounding magazines shall be kept clear of brush, dried grass, leaves and similar combustibles for a distance of at least 25 feet.

c. Combustible materials shall not be stored within 50 feet of magazines.

d. Explosive materials recovered from blasting misfires shall be placed in a separate magazine until competent personnel has determined from the manufacturer the method of disposal. Caps and electric blasting caps recovered from blasting misfires shall not be reused. Such explosive materials shall then be disposed of in the manner recommended.

e. Property upon which Type 1 magazines are located and property upon which all outdoor magazines of Types 2, 4 and 5 are located shall be posted with signs reading "Explosives — Keep Off." Such signs shall be located so as to minimize the possibility that a bullet that is shot at the sign will hit the magazine.

CHAPTER 4. TRANSPORTATION OF EXPLOSIVE MATERIALS ON HIGHWAYS

41. General Provisions

411. In addition to all other applicable requirements set forth in this Code, the transportation of explosive materials over all highways shall be in accordance with U. S. Department of Transportation regulations. U. S. Department of Transportation regulations and changes lawfully on file and approved by the U. S. Department of Transportation are hereby adopted as a part of this Code.

412. Explosive materials shall not be transported through any prohibited vehicular tunnel, or subway, or over any prohibited bridge, roadway, or elevated highway.

413. No person shall smoke, carry matches or any other flame-producing device, or carry any unauthorized firearms or loaded cartridges while in or near a motor vehicle transporting explosive materials; or drive, load or unload such vehicle in a careless or reckless manner.

414. Explosive materials, other than those that are essential to promote safety of the passengers or the operation of the vehicle, shall not be carried or transported in or upon a public conveyance or vehicle carrying passengers for hire.

415. Explosive materials shall not be transferred from one vehicle to another within the (name of city, county, state, or other area) without informing the fire and police departments thereof. In the event of breakdown or collision the local fire and police departments shall be promptly notified to help safeguard such emergencies. Explosive materials shall be transferred from the disabled vehicle to another only when proper and qualified supervision is provided.

416. Blasting caps, blasting caps with safety fuse, blasting caps with metalclad mild detonating fuse and electric blasting caps may be transported with other explosives in the same motor vehicle only in accordance with the Code of Federal Regulations (Title 49, Chapter I, Parts 170-189).

417. This chapter does not apply to the transportation of small arms ammunition and components (see Chapter 9).

42. Transportation Vehicles

421. Vehicles used for transporting explosive materials shall be

strong enough to carry the load without difficulty and be in good mechanical condition. If vehicles do not have a closed body, the body shall be covered with a flame retardant and moistureproof tarpaulin or other effective protection against moisture and sparks. All vehicles used for the transportation of explosive materials shall have tight floors and any exposed spark-producing metal on the inside of the body shall be covered with wood or other nonsparking materials to prevent contact with packages of explosives. Packages of explosive materials shall not be loaded above the sides of an open-body vehicle.

422. Every vehicle used for transporting explosive materials and certain oxidizing materials shall be marked as follows:

a. Exterior markings or placards required on applicable vehicles shall be as follows for the various classes of commodities:

Commodity	Type of Marking or Placard
Explosives, Class A, any quantity or a combination of Class A and Class B explosives.	EXPLOSIVES A (Red letters on white background)
Explosives, Class B, any quantity.	EXPLOSIVES B (Red letters on white background)
Oxidizing material (blasting agents, ammonium nitrate, etc.), 1,000 pounds or more gross weight.	OXIDIZERS (Yellow letters on black background)

b. Each marking or placard shall consist of letters not less than 4 inches high, in the color specified, using approximately a ⅝-inch stroke. The placard must be larger than the lettering required thereon by at least 1 inch at the top and bottom sides. Such marking or placard described in Paragraph a shall be contained in an area on the vehicle which has no other marking, lettering, or graphic display, for at least 3 inches in each direction.

c. Such markings or placards shall be displayed at the front, rear, and on each side of the motor vehicle or trailer, or other cargo-carrying body while it contains explosives or other dangerous articles of such type and in such quantity as specified in Paragraph a. The front marking or placard may be displayed on the front of either the truck, truck body, truck tractor or the trailer.

d. Any motor vehicle, trailer, or other cargo-carrying body containing more than one kind of explosive as well as an oxidizing material requiring a placard under the provisions of Paragraph a, the aggregate gross weight of which totals 1,000 pounds or more, shall be marked or placarded "Dangerous" as well as "Ex-

plosive A" or "Explosive B" as appropriate. If explosives Class A and explosives Class B are loaded on the same vehicle, the "Explosives B" marking need not be displayed.

e. In any combination of two or more vehicles containing explosives or other dangerous articles each vehicle shall be marked or placarded as to its contents and in accordance with Paragraphs a and c of this section.

423. Each motor vehicle used for transporting explosive materials shall be equipped with a fire extinguisher having a rating of at least 10-BC.

a. Only extinguishers listed or approved by a nationally recognized fire equipment testing laboratory, shall be deemed suitable for use on explosive materials-carrying vehicles.

b. Extinguishers shall be filled and ready for immediate use and located near the driver's seat. Extinguishers shall be examined periodically by a competent person.

424. A motor vehicle used for transporting explosives shall be inspected to determine that it is in proper condition for safe transportation of explosives:

1. The fire extinguisher shall be filled and in working order.
2. All electrical wiring shall be completely protected and securely fastened to prevent short-circuiting.
3. Chassis, motor, pan and underside of body shall be reasonably clean and free of excess oil and grease.
4. Fuel tank and feed line shall be secure and have no leaks.
5. Brakes, lights, horn, windshield wipers, and steering apparatus shall function properly.
6. Tires shall be checked for proper inflation and defects.
7. The vehicle shall be in proper condition in every other respect and acceptable for handling explosives.

43. Operation of Transportation Vehicles

431. Vehicles transporting explosive materials shall only be driven by and be in the charge of a properly licensed driver who is physically fit, careful, capable, reliable, able to read and write the English language, and not addicted to the use, or under the influence of intoxicants, narcotics, or other dangerous drugs, and not less than 21 years of age. He shall be familiar with the traffic regulations, state laws, and the provisions of this Code.

432. Except under emergency conditions, no vehicle trans-

porting explosives shall be parked before reaching its destination, even though attended, on any public street adjacent to or in proximity to any bridge, tunnel, dwelling, building, or place where people work, congregate, or assemble.

433. Every motor vehicle transporting any quantity of Class A or Class B explosives shall, at all times, be attended by a driver or other qualified representative of the motor carrier operating the vehicle. This attendant shall have been made aware of the class of the explosive material in the vehicle and of its inherent dangers, and shall have been instructed in the measures and procedures to be followed in order to protect the public from those dangers. He shall have been made familiar with the vehicle he is assigned to attend, and shall be trained, supplied with the necessary means, and authorized to move the vehicle when required.

a. For the purpose of this section, a motor vehicle shall be deemed "attended" only when the driver or other attendant is physically on or in the vehicle, or has the vehicle within his field of vision and can reach it quickly and without any kind of interference; "attended" also means that the driver or attendant is awake, alert and not engaged in other duties or activities which may divert his attention from the vehicle, except for necessary communication with public officers, or representatives of the carrier, shipper or consignee, or except for necessary absence from the vehicle to obtain food or to provide for his physical comfort.

b. However, an explosive-laden vehicle may be left unattended if parked in an area where such parking is permitted such as an area complying with the requirements of NFPA No. 498, Standard for Explosives Motor Vehicle Terminals.*

434. No spark-producing metal, spark-producing metal tools, oils, matches, firearms, electric storage batteries, flammable substances, acids, oxidizing materials, or corrosive compounds shall be carried in the body of any motor truck and/or vehicle transporting explosive materials unless the loading of such hazardous materials complies with U. S. Department of Transportation regulations.

435. Vehicles transporting explosive materials shall avoid congested areas and heavy traffic. Where routes through congested areas have been designated by local authorities such routes shall be followed.

436. Delivery shall only be made to authorized persons and into authorized magazines or approved temporary storage or handling areas.

* See Appendix A49.

CHAPTER 5. USE OF EXPLOSIVE MATERIALS

51. General Provisions

511. No explosives shall be abandoned.

512. While explosive materials are being handled or used, smoking shall not be permitted and no one near the explosive materials shall possess matches, open light or other fire or flame. No person shall handle explosive materials while under the influence of intoxicating liquors, narcotics, or other dangerous drugs.

513. Explosive materials not in unopened original packages shall be transported from storage magazines to the blasting area in closed body vehicles.

514. When blasting is done in congested areas or in close proximity to a structure, railway, or highway or any other installation that may be damaged, the blast shall be covered before firing with a mat constructed so that it is capable of preventing fragments from being thrown.

515. Persons authorized to prepare explosive charges or conduct blasting operations shall use every reasonable precaution, including but not limited to warning signals, flags, barricades, or woven wire mats to insure the safety of the general public and workmen.

516. Surface blasting operations, except during unusual conditions, shall be conducted during daylight hours.

517. Whenever blasting is being conducted in the vicinity of gas, electric, water, fire alarm, telephone, telegraph and steam utilities, the blaster shall notify the appropriate representatives of such utilities at least 24 hours in advance of blasting, specifying the location and intended time of such blasting. Verbal notice shall be confirmed with written notice. In an emergency this time limit may be waived.

518. Due precautions shall be taken to prevent accidental discharge of electric blasting caps from current induced by radar, radio transmitters, lightning, adjacent power lines, dust storms, or other sources of extraneous electricity. These precautions shall include:

1. The suspension of all blasting operations and removal of persons from the blasting area during the approach and progress of an electric storm.

2. The posting of signs warning against the use of mobile radio transmitters on all roads within 350 feet of the blasting operations.
3. Compliance with the latest recommendations of the Institute of Makers of Explosives with regard to blasting in the vicinity of radio transmitters or power lines.

519. All the requirements of Chapter 2, Security and Safety of Explosive Materials, shall be followed.

52. Packaging; Deteriorated Explosives

521. Empty boxes and paper and fiber packing materials which have previously contained high explosives shall not be used again for any purpose, but shall be destroyed by burning at an approved isolated location out of doors, and no person shall be nearer than 100 feet after the burning has started.

522. Wood containers of explosive materials shall not be opened in any magazine or within 50 feet of any magazine. In opening kegs or wooden cases, no sparking metal tools shall be used; wooden wedges and either wood, fiber or rubber mallets shall be used. Nonsparking metallic slitters may be used for opening fiberboard cases.

523. Explosive materials that are obviously deteriorated or damaged shall not be used and shall be destroyed in accordance with Section 361(a).

53. Loading of Explosive Materials in Blast Holes

531. All drill holes shall be sufficiently large to admit freely the insertion of the packages of explosive materials.

532. Tamping shall be done only with wood rods without exposed metal parts, but nonsparking metal connectors may be used for jointed poles. Violent tamping shall be avoided. Primed cartridge shall not be tamped.

533. When loading blasting agents pneumatically over electric blasting caps the requirements in Section 734 shall be followed.

534. No holes shall be loaded except those to be fired in the next round of blasting. After loading, all remaining explosives shall be immediately returned to an authorized magazine.

535. Drilling shall not be started until all remaining butts

of old holes are examined with a wooden stick for unexploded charges, and if any are found, they shall be refired before work proceeds.

536. No person shall be allowed to deepen drill holes which have contained explosive materials.

537. After loading for a blast is completed, all excess blasting caps or electric blasting caps and other explosive materials shall immediately be returned to their separate storage magazines.

54. Initiation of Explosive Charges

541. Only electric blasting caps shall be used for blasting operations in congested districts, or on highways, or adjacent to highways open to traffic, except where sources of extraneous electricity make such use dangerous.

542. When fuse is used, the blasting cap shall be securely attached to the safety fuse with a standard ring type cap crimper. All primers shall be assembled at least fifty feet from any magazine.

543. Primers for use in surface blasting shall be made up only as required for each round of blasting. Only the number of primers required for the next round to be blasted shall be taken to the face when loading is begun.

Note: In the case of underground blasting, it is often safest to make up primers at a location away from the face to be blasted.

544. No blasting cap shall be inserted in the explosive materials without first making a hole in the cartridge for the cap with a wooden punch of proper size or standard cap crimper.

545. Explosive materials shall not be extracted from a hole that has once been charged or has misfired unless it is impossible to detonate the unexploded charge by insertion of a fresh additional primer.

546. If there are any misfires while using cap and fuse, all persons shall remain away from the charge for at least one hour. If electric blasting caps are used and a misfire occurs, this waiting period may be reduced to thirty minutes. Misfires shall be handled under the direction of the person in charge of the blasting and all wires shall be carefully traced and search made for unexploded charges.

547. Blasters, when testing circuits to charged holes, shall use only blasting galvanometers designed for this purpose. The blasting galvanometer shall be powered only by a battery made for the specific purpose.

548. Only the man making leading wire connections in electrical firing shall fire the shot. All connections shall be made from bore hole back to the source of firing current, and the leading wires shall remain shorted and not be connected to the blasting machine or other source of current until the charge is to be fired.

55. Warning Required

551. Before a blast is fired, a loud warning signal shall be given by the person in charge, who has made certain that all surplus explosives are in a safe place, all persons and vehicles are at a safe distance or under sufficient cover, and that an adequate warning has been given.

CHAPTER 6. EXPLOSIVES AT PIERS, RAILWAY, TRUCK AND AIR TERMINALS

61. General Provisions

611. Except in an emergency and with permission of the local authority having jurisdiction, no person shall have or keep explosives in a railway car unless said car and contents and methods of loading are in accordance with the regulations of the U. S. Department of Transportation.

612. No person shall deliver any explosive to any carrier unless such explosive conforms in all respects, including marking and packing, to the regulations of the U. S. Department of Transportation.

613. Every railway car containing explosives which has reached its destination, or is stopped in transit so as no longer to be in interstate commerce, shall remain placarded in accordance with the regulations of the U. S. Department of Transportation.

614. Any explosives at a railway facility, truck terminal, pier, wharf, harbor facility, or airport terminal, whether for delivery to a consignee, or forwarded to some other destination, shall be kept in a safe place, isolated as far as practicable and in such manner that they can be easily and quickly removed.

615. Truck terminals for explosives vehicles shall be in accordance with NFPA No. 498, Standard for Explosives Motor Vehicle Terminals.*

62. Notifications

621. A consignee, having been notified that a shipment of explosives is in the hands of any carrier, shall remove the said explosives within 48 hours, Saturdays, Sundays and holidays excluded, after receiving such notification, to some place meeting the requirements of this Code

63. Trailer-on-Flatcar, Container-on-Flatcar Facilities

631. Railway shipments of explosives by trailer-on-flatcar (TOFC) or container-on-flatcar (COFC) shall comply with the following requirements:

a. Shipments of explosives by TOFC or COFC shall not be

* See Appendix A49.

unloaded at a nonagency station unless the consignee is there to receive them or unless properly locked and secure storage facilities are provided at that point for their protection. If delivery cannot be made, the shipment shall be taken to the next or nearest agency station for delivery.

b. Carriers shall require the consignee to remove TOFC and COFC shipments from the carriers' property within 48 hours after notice of arrival has been sent or given. Saturdays, Sundays, and holidays are not included. If the trailers or containers are not so removed, the carrier shall immediately dispose of the shipment by storage, by disposal or, when necessary to safety, by destruction under supervision of a competent person.

NOTE: For specific requirements see Section 174.564 of the Code of Federal Regulations (Title 49, Chapter I).*

c. If storage is required to comply with Paragraph b above, storage shall be in an interchange lot similar to that prescribed in Chapter 2 or 3 of NFPA No. 498, Standard for Explosives Motor Vehicle Terminals,† or in a place that will provide equivalent safety to the public.

d. When local conditions make the acceptance, transportation, or delivery of explosives unusually hazardous, local restrictions shall be imposed by the carrier.

e. All rail carriers shall report to the Bureau of Explosives (see Foreword for address) for publication of full information as to restrictions which may be imposed against the acceptance, delivery or transportation of explosives over any portion of their lines.

f. For shipment of Class A explosives, when practicable at any point, regular days shall be assigned for receiving trailers and containers for shipment.

g. To enable the carrier to provide proper flatcars for shipment of Class A explosives, the shipper shall give to the carrier not less than 24 hours' notice of his intention to offer such shipments and state their destinations. When a regular day has been appointed to receive trailers and containers for shipment, this notice may be waived by the carrier, but the explosives shipments shall be delivered on such days in time to permit proper inspection, billing, and loading on that day.

h. Carriers shall forward shipments promptly and within 48 hours, Saturdays, Sundays, and holidays excluded, after accept-

* See Appendix A32.

†See Appendix A49.

ance at the originating point or receipt at any yard transfer station or interchange point, except that where biweekly or weekly service is performed, shipments must be forwarded on the first available train.

i. The Bureau of Explosives (see Foreword for address) shall be consulted by rail carriers to determine that the storage facility required in Paragraph b above is safe and adequate and in reasonable compliance with Chapter 2 of NFPA No. 498, Standard for Explosives Motor Vehicle Terminals.*

j. Cars loaded with explosive materials shall be so placed that they will be safe from all probable danger from fire. They shall not be placed under bridges or overhead highway crossings, nor in or alongside of passenger sheds or stations, except for loading or unloading purposes.

64. Designation of Facilities

641. The local authority having jurisdiction has the authority to and may designate the location for, and limit the quantity of, explosives which may be loaded, unloaded, reloaded, or temporarily retained at any facility within the jurisdiction.

---

* See Appendix A49.

CHAPTER 7. BLASTING AGENTS

71. General Provisions

711. Unless otherwise set forth in this chapter, blasting agents, excluding water gels, shall be transported, stored, and used in the same manner as explosives. Water gels are covered in Chapter 8.

72. Fixed Location Mixing

721. Buildings or other facilities used for mixing blasting agents shall be located, with respect to inhabited buildings, passenger railroads and public highways, in accordance with the American Table of Distances.*

a. In determining the distance separating highways, railroads and inhabited buildings from potential explosions (as prescribed in the American Table of Distances), the sum of all masses which may propagate (i.e., lie at distances less than prescribed in Appendix A12) from *either* individual *or* combined donor masses are included. However, when the ammonium nitrate must be included, only 50 percent of its weight shall be used because of its reduced blast effects.

722. Buildings used for the mixing of blasting agents shall conform to the requirements of this section, unless otherwise specifically approved by the authority having jurisdiction.

a. Buildings shall be of noncombustible construction or sheet metal on wood studs.

b. Floors in a mixing plant shall be of concrete or of other nonabsorbent materials.

c. All fuel oil storage facilities shall be separated from the mixing plant and located in such a manner that in case of tank rupture, the oil will drain away from the mixing plant building.

d. The building shall be well ventilated.

e. Heating units which do not depend on combustion processes, when properly designed and located, may be used in the building. All direct sources of heat shall be provided exclusively from units located outside the mixing building.

f. All internal-combustion engines used for electric power generation shall be located outside the mixing plant building, or shall be properly ventilated and isolated by a firewall. The exhaust systems on all such engines shall be located so any spark emission cannot be a hazard to any materials in or adjacent to the plant.

* See Appendix A11.

723. Equipment used for mixing blasting agents shall conform to the requirements of this section.

a. The design of the mixer shall minimize the possibility of frictional heating, compaction, and especially confinement. All bearings and drive assemblies shall be mounted outside the mixer and protected against the accumulation of dust. All surfaces shall be accessible for cleaning.

b. Mixing and packaging equipment shall be constructed of materials compatible with the fuel-ammonium nitrate composition.

c. Suitable 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.

724. The provisions of this section shall be considered when determining blasting agent compositions.

a. The sensitivity of the blasting agent shall be determined by means of a No. 8 test blasting cap at regular intervals and after every change in formulation, or as may be requested by the authority having jurisdiction.

b. Oxidizers of small particle size, such as crushed ammonium nitrate prills or fines, may be more sensitive than coarser products and shall, therefore, be handled with greater care.

c. No hydrocarbon liquid fuel with flash point lower than that of No. 2 diesel fuel oil (125° F minimum or legal) shall be used.

d. Crude oil and crankcase oil shall not be used because they may contain light ends that offer increased vapor-explosion hazards or gritty particles that tend to sensitize the resulting blasting agent.

e. Metal powders such as aluminium shall be kept dry and shall be stored in containers or bins which are moisture-resistant or weather-tight. Solid fuels shall be used in such manner as to minimize dust explosion hazards.

f. Peroxides and chlorates shall not be used.

g. The requirements of Paragraphs c, d and f do not apply to compositions made under the supervision of qualified personnel capable of determining the overall hazards of the resulting product in its manufacture, storage, transportation and use.

725. All electrical switches, controls, motors, and lights located in the mixing room shall conform to the requirements in the National Electrical Code* for Class II, Division 2 locations; other-

* See Appendix A44.

wise they shall be located outside the mixing room. The frame of the mixer and all other equipment that may be used shall be electrically bonded and be provided with a continuous path to the ground.

726. Safety precautions at mixing plants shall include the requirements of this section.

a. Floors shall be constructed so as to eliminate floor drains and piping into which molten materials could flow and be confined in case of fire.

b. The floors and equipment of the mixing and packaging room shall be cleaned regularly and thoroughly to prevent accumulation of oxidizers or fuels and other sensitizers.

c. The entire mixing and packaging plant shall be cleaned regularly and thoroughly to prevent excessive accumulation of dust.

d. Smoking, matches, open flames, spark-producing devices and firearms (except firearms carried by guards when authorized by the authority having jurisdiction) shall not be permitted inside of or within 50 feet of any building or facility used for the mixing of blasting agents.

e. The land surrounding the mixing plant shall be kept clear of brush, dried grass, leaves and other materials for a distance of at least 25 feet.

f. Empty ammonium nitrate bags shall be disposed of daily in a safe manner.

g. No welding shall be permitted or open flames used in or around the mixing or storage area of the plant unless the equipment or area has been completely washed down and all oxidizer material removed.

h. Before welding or repairs to hollow shafts, all oxidizer material shall be removed from the outside and inside of the shaft and the shaft vented with a minimum ½-inch diameter opening.

i. Explosives shall not be stored inside of or within 50 feet of any building or facility used for the mixing of blasting agents.

73. Bulk Delivery and Mixing Vehicles

731. The provisions of Article 73 shall apply to off-highway private operations as well as to all public highway movements.

* See Appendix A44.

732. A bulk vehicle body for delivering and mixing blasting agents shall conform to the construction requirements of this section.

a. The body shall be constructed of noncombustible materials.

b. Vehicles used to transport bulk premixed blasting agents on public highways shall have closed bodies.

c. All moving parts of the mixing system shall be designed as to prevent a heat buildup. Shafts or axles which contact the product shall have outboard bearings with one-inch minimum clearance between the bearings and the outside of the product container. Particular attention shall be given to the clearances on all moving parts.

d. A bulk delivery vehicle shall be strong enough to carry the load without difficulty and be in good mechanical condition.

733. Operation of bulk delivery vehicles shall conform to the requirements of this section.

a. The hauling of ammonium nitrate prills or blasting agent over public highways is subject to existing local, state and Federal regulations. These include the placarding requirements as specified by U. S. Department of Transportation regulations.

b. Vehicles transporting blasting agents shall only be driven by and be in charge of a driver at least 21 years of age who is capable, careful, reliable and in possession of a valid motor vehicle operator's license. Such a person shall also be familiar with the State vehicle and traffic laws.

c. The operator shall be trained in the safe operation of the vehicle together with its mixing, conveying, and related equipment. He shall be familiar with the commodities being delivered and the general procedure for handling emergency situations.

d. No person shall be permitted to ride upon, drive, load or unload a vehicle containing blasting agents while smoking or under the influence of intoxicants, narcotics, or other dangerous drugs.

e. Vehicles transporting blasting agents shall be in safe operating condition at all times.

f. The hauling of either blasting caps or other explosives, but not both, shall be permitted on bulk trucks provided that a special wood or nonferrous-lined container is installed for the explosives. Such blasting caps or other explosives shall be in shipping containers specified by the U. S. Department of Transportation.

g. No person shall smoke, carry matches or any flame-producing device, or carry any firearms while in or about bulk vehicles effecting the mixing transfer or down-the-hole loading of blasting agents at or near the blasting site.

h. Caution shall be exercised in the movement of the vehicle in the blasting area to avoid driving the vehicle over or dragging hoses over firing lines, cap wires, or explosive materials. The driver in moving the vehicle shall obtain the assistance of a second person to guide his movements.

i. No in-transit mixing of materials shall be performed.

734. Pneumatic loading from bulk delivery vehicles into blast holes primed with electric blasting caps or other static-sensitive systems shall conform to the requirements of this section.

a. A positive grounding device shall be used to prevent the accumulation of static electricity.

b. A discharge hose shall be used that has a resistance range that will prevent conducting stray currents, but that is conductive enough to bleed off static buildup.

c. A qualified person shall evaluate all systems to determine if they will adequately dissipate static under potential field conditions.

735. Repairs to bulk delivery vehicles shall conform to the requirements of this section.

a. No welding or open flames shall be used on or around any part of the delivery equipment unless it has been completely washed down and all oxidizer material removed.

b. Before welding or repairs to hollow shafts, the shaft shall be thoroughly cleaned inside and out and vented with a minimum ½-inch-diameter opening.

74. Bulk Storage Bins

741. The bin shall be a Type 5 magazine and shall be waterproof.

742. The bin, including supports, shall be constructed of compatible materials,* and adequately supported and braced to withstand the combination of all loads, including impact forces arising from product movement within the bin and accidental vehicle contact with the support legs.

*See Section 422 of NFPA No. 490, Code for the Storage of Ammonium Nitrate (see Appendix A47) for guidance on choosing compatible materials.

743. The bin discharge gate shall be designed to provide a closure tight enough to prevent leakage of the stored product. Provision shall also be made so that the gate can be locked.

744. Bin loading manways or access hatches shall be hinged or otherwise attached to the bin and be designed to permit locking.

745. Any electrically driven conveyors for loading or unloading bins shall conform to the requirements of the National Electrical Code.* They shall be designed to minimize damage from corrosion.

746. Bins containing blasting agents shall be located, with respect to inhabited buildings, passenger railroads and public highways, in accordance with the American Table of Distances.†

747. Bins containing blasting agents shall be located, with respect to other blasting agent storage and explosive storage, in conformity with the Table of Recommended Separation Distances of Ammonium Nitrate and Blasting Agents from Explosives or Blasting Agents,** and the American Table of Distances for Storage of Explosives.†

748. Bins containing ammonium nitrate shall be separated from blasting agent storage and explosives storage in conformity with the Table of Recommended Separation Distances of Ammonium Nitrate and Blasting Agents from Explosives or Blasting Agents.**

749. Good housekeeping practices shall be maintained around any bin containing ammonium nitrate or blasting agent. This includes keeping weeds and other combustible materials cleared within 25 feet of such bin. Accumulation of spilled product on the ground shall be prevented.

75. Storage of Blasting Agents and Supplies

751. Blasting agents and oxidizers used for mixing of blasting agents shall be stored in the manner set forth in this section.

a. Blasting agents or ammonium nitrate, when stored in conjunction with explosives, shall be stored in the manner set forth in Chapter 3 for explosives. The mass of blasting agents and one-half the mass of ammonium nitrate shall be included when computing the total quantity of explosive materials for determining distance requirements.

---

* See Appendix A44.

** See Appendix A12.

† See Appendix A11.

b. Blasting agents, when stored entirely separate from explosives, shall be stored in a Type 5 magazine or a magazine of higher classification (lower number).

c. Magazines in which blasting agents are stored shall be constructed so as to eliminate open floor drains and piping into which molten materials could flow and be confined in case of fire.

d. Semitrailer or full-trailer vans used for highway or on-site transportation of the blasting agents are satisfactory for temporarily storing these materials, provided they are located in accordance with the American Table of Distances* with respect to inhabited buildings, passenger railways, and public highways and according to the Table of Recommended Separation Distances of Ammonium Nitrate and Blasting Agents from Explosives or Blasting Agents** with respect to one another. Trailers shall be provided with substantial means for locking, and the trailer doors shall be kept locked, except during the time of placement and removal of stocks of blasting agents.

752. Piles of ammonium nitrate and warehouses containing ammonium nitrate shall be adequately separated from readily combustible fuels.

753. Caked oxidizers, either in bags or in bulk, shall not be loosened by blasting.

754. Every magazine used for the storage of blasting agents shall be under the supervision of a competent person who shall be not less than 21 years of age.

76. Transportation of Packaged Blasting Agents

761. When blasting agents are transported in the same vehicle with explosives, all of the requirements of Chapter 4 shall be complied with.

762. Vehicles transporting blasting agents shall only be driven by and be in charge of a driver at least 21 years of age who is capable, careful, reliable and in possession of a valid motor vehicle operator's license. Such a person shall also be familiar with the State vehicle and traffic laws.

763. No matches, firearms, acids or other corrosive liquids shall be carried in the bed or body of any vehicle containing blasting agents.

---

* See Appendix A11.

** See Appendix A12.

764. No person shall be permitted to ride upon, drive, load or unload a vehicle containing blasting agents while smoking or under the influence of intoxicants, narcotics, or other dangerous drugs.

765. It is prohibited for any person to transport or carry any blasting agents upon any public vehicle carrying passengers for hire.

766. Vehicles transporting blasting agents shall be in safe operating condition at all times.

767. When blasting agents are offered for transportation on public highways the packaging, marking and labeling of containers of blasting agents shall comply with the requirements of the U. S. Department of Transportation.*

768. Vehicles used for transporting blasting agents on public highways shall be placarded in accordance with regulations of the U. S. Department of Transportation*.

77. Use of Blasting Agents

771. Persons using blasting agents shall comply with all of the applicable provisions of Chapters 2 and 5 of this Code.

* See Appendix A32.

CHAPTER 8. WATER GELS (Slurries)

81. General Provisions

811. Unless otherwise set forth in this chapter, water gels shall be transported, stored and used in the same manner as explosives or blasting agents in accordance with the classification of the product.

82. Types and Classifications

821. Water gels containing a substance in itself classified as an explosive shall be classified as an explosive and manufactured, transported, stored and used as specified for "explosives" in this Code, except that those that are not cap-sensitive may be stored in Type 4 magazines.

822. Water gels containing no substance in itself classified as an explosive and which are cap-sensitive as defined in Section 121 under Blasting Agent shall be classified as an explosive and manufactured, transported, stored and used as specified for "explosives" in this Code.

823. Water gels containing no substance in itself classified as an explosive and which are not cap-sensitive as defined in Section 121 under Blasting Agent shall be classified as blasting agents and manufactured, transported, stored and used as specified for "blasting agents" in this Code.

83. Fixed Location Mixing

831. Buildings or other facilities used for mixing water gels shall be located with respect to inhabited buildings, passenger railroads and public highways, in accordance with the American Table of Distances.*

a. In determining the distances separating highways, railroads, and inhabited buildings from potential explosions (as prescribed in the American Table of Distances), the sum of all masses that may propagate (i.e., lie at distances less than prescribed in Appendix A12) from *either* individual *or* combined donor masses are included. However, when the ammonium nitrate must be included, only one-half of its weight shall be used because of its reduced blast effects.

832. Buildings used for the mixing of water gels shall conform

* See Appendix A11.

to the requirements of this section, unless otherwise specifically approved by the authority having jurisdiction.

a. Buildings shall be of noncombustible construction or sheet metal on wood studs.

b. Floors in a mixing plant shall be of concrete or of other nonabsorbent materials.

c. Where fuel oil is used all fuel oil storage facilities shall be separated from the mixing plant and located in such a manner that in case of tank rupture, the oil will drain away from the mixing plant building.

d. The building shall be well ventilated

e. Heating units that do not depend on combustion processes, when properly designed and located, may be used in the building. All direct sources of heat shall be provided exclusively from units located outside of the mixing building.

f. All internal-combustion engines used for electric power generation shall be located outside the mixing plant building, or shall be properly ventilated and isolated by a firewall. The exhaust systems on all such engines shall be located so any spark emission cannot be a hazard to any materials in or adjacent to the plant.

833. Ingredients of water gels shall conform to the requirements of this section.

a. Ingredients in themselves classified as explosives shall be stored in conformity with Chapter 3, Aboveground Storage of Explosive Materials.

b. Nitrate-water solutions may be stored in tank cars, tank trucks, or fixed tanks without quantity or distance limitations. Spills or leaks which may contaminate combustible materials shall be cleaned up immediately.

c. Metal powders such as aluminum shall be kept dry and shall be stored in containers or bins which are moisture-resistant or weather-tight. Solid fuels shall be used in such manner as to minimize dust explosion hazards.

d. Ingredients shall not be stored with incompatible materials.

e. Peroxides and chlorates shall not be used.

834. Mixing equipment shall comply with the requirements of this section.

a. The design of the processing equipment, including mixing and conveying equipment, shall be compatible with the relative sensitivity of the materials being handled. Equipment shall be

designed to minimize the possibility of frictional heating, compaction, overloading, and confinement.

b. Both equipment and handling procedures shall be designed to prevent the introduction of foreign objects or materials.

c. Mixers, pumps, valves and related equipment shall be designed to permit regular and periodic flushing, cleaning, dismantling and inspection.

d. All electrical equipment including wiring, switches, controls, motors and lights, shall conform to the requirements of the National Electrical Code, NFPA No. 70.*

e. All electric motors and generators shall be provided with suitable overload protection devices. Electrical generators, motors, proportioning devices, and all other electrical enclosures shall be electrically bonded. The grounding conductor to all such electrical equipment shall be effectively bonded to the service-entrance ground connection and to all equipment ground connections in a manner so as to provide a continuous path to ground.

835. Mixing facilities shall comply with the fire prevention requirements of this section.

a. The mixing, loading and ingredient transfer areas where residues or spilled materials may accumulate shall be cleaned periodically. A cleaning and collection system for dangerous residues shall be provided.

b. A daily visual inspection shall be made of the mixing, conveying and electrical equipment to establish that such equipment is in good operating condition. A program of systematic maintenance shall be conducted on regular schedule.

c. Heaters which are not dependent on the combustion process within the heating unit may be used within the confines of processing buildings or compartments, if provided with temperature and safety controls and located away from combustible materials and the finished product.

84. Bulk Delivery and Mixing Vehicles

841. The design of vehicles shall comply with the requirements of this section.

a. Vehicles used over public highways for the bulk transportation of water gels or of ingredients calssified as dangerous commodities, shall meet the requirements of the Department of Transportation

* See Appendix A44.

and shall meet the requirements of Chapter 4 and of Article 76 (Chapter 7) of this Code.

b. When electric power is supplied by a self-contained motor generator located on the vehicle the generator shall be at a point separate from where the water gel is discharged.

c. The design of processing equipment and general requirements shall conform to Section 833 and Section 834.

d. A positive action parking brake which will set the wheel brakes on at least one axle shall be provided on vehicles when equipped with air brakes and shall be used during bulk delivery operations. Wheel chocks shall supplement parking brakes whenever conditions may require.

842. Operation of bulk delivery and mixing vehicles shall comply with the requirements of this section.

a. The hauling of water gel explosives or blasting agent over public highways is subject to existing local, state and Federal regulations. These include the placarding requirements as specified by regulations of the U. S. Department of Transportation.

b. The operator shall be trained in the safe operation of the vehicle together with its mixing, conveying, and related equipment. He shall be familiar with the commodities being delivered and the general procedure for handling emergency situations.

c. The hauling of either blasting caps or other explosives, but not both, shall be permitted on bulk trucks provided that a special wood or nonferrous-lined container is installed for the explosives. Such blasting caps or other explosives shall be in shipping containers specified by the U. S. Department of Transportation.

d. No person shall smoke, carry matches or any flame-producing device, or carry any firearms while in or about bulk vehicles effecting the mixing, transfer or down-the-hole loading of water gels at or near the blasting site.

e. Caution shall be exercised in the movement of the vehicle in the blasting area to avoid driving the vehicle over or dragging hoses over firing lines, cap wires, or explosive materials. The driver in moving the vehicle shall obtain the assistance of a second person to guide his movements.

f. No in-transit mixing of materials shall be performed.

g. The location chosen for water gel or ingredient transfer from a support vehicle into the borehole loading shall be away from the blast hole site when the boreholes are loaded or in the process of being loaded.