

N. J. A. C. 12:190 (Safety Regulation No. 20)  
N. J. A. C. 12:191 (Safety Regulation No. 21)  
N. J. A. C. 12:192 (Safety Regulation No. 22)  
N. J. A. C. 12:193 (Safety Regulation No. 23)

# EXPLOSIVES.

STATE OF NEW JERSEY.  
DEPARTMENT OF LABOR & INDUSTRY.  
BUREAU OF ENGINEERING & SAFETY.  
TRENTON, NEW JERSEY

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## FOREWORD

This reprint of Chapter 190, Explosives Permits and Fees, effective January 15, 1962; Chapter 191, The Transportation of Explosives, effective December 14, 1962; Chapter 192, The Storage of Explosives, effective August 20, 1965; and Chapter 193, The Use of Explosives, effective August 20, 1965; all of Title 12, N.J.A.C. combines the separate regulations in one bound document.

These four Chapters establish reasonable requirements for explosives in the interest of the life, health, and safety of employees and the public, as well as the protection of property. Three of these Chapters cover the storage, use and transportation of explosives. The fourth Chapter covers requirements for explosive permits and fees that are consistent with the Law.

These Chapters were promulgated by the Commissioner of Labor and Industry of the State of New Jersey, to be effective on the date shown on each title sheet, under authority vested in him by Law:

R.S. 21:1A-131. The Commissioner may make and promulgate rules and regulations necessary to further the purposes of this act. The rules and regulations may include requirements that are not mentioned specifically in this act, but which are reasonably necessary for the safety of the workers and the public and the protection of property.

The term explosives as used in these Chapters is defined in the Law itself as follows:

"Explosives" means any chemical compound or mixture that is commonly used or intended for the purpose of producing an explosion, that contains any oxidizing and combustible materials or other ingredients, in such proportions, quantities or packing that an ignition by fire, by friction, by concussion or by detonation of any part of the compound or mixture may cause such a sudden generation of highly heated gases that the resultant gaseous pressures are capable of producing destructive effects on contiguous objects. The term "explosives" shall include, but is not limited to commercial explosives, propellants and nitro-carbonitrates. The term "explosives" except as specifically stated in this act, shall not include small arms ammunition, explosives in the form prescribed by the official United States Pharmacopoeia, or fireworks regulated under Revised Statutes sections 21:2-1 through 21:2-7.

In the writing of these Chapters, the Bureau was guided by the recommendations of the Institute of Makers of Explosives; the United States Bureau of Mines; the Bureau of Explosives of the Association of American Railroads; the National Fire Protection Association; and the Ordnance Corps. Safety Manual, Department of the Army.

Chapter 190 of Title 12, N.J.A.C. (Safety Regulation No. 20) supersedes Safety Regulation No. 20, Explosives Permits and Fees which was filed with the Secretary of State on September 5, 1961.

Prior to promulgation, these Chapters were submitted to the New Jersey State Industrial Safety Committee, written notice of the proposed promulgation was given all holders of explosive permits, and Public Hearing was held on Chapter 192, The Storage of Explosives and Chapter 193, The Use of Explosives both of Title 12, N.J.A.C.

# **N. J. A. C. 12:190**

(SAFETY REGULATION No. 20)

## **EXPLOSIVES PERMITS *and* FEES**

*Effective January 15, 1962*

STATE OF NEW JERSEY  
DEPARTMENT OF LABOR & INDUSTRY  
BUREAU OF ENGINEERING & SAFETY  
TRENTON, NEW JERSEY

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## **SECTION 1 — PURPOSE AND SCOPE**

### **1.1 PURPOSE**

This Regulation is promulgated to establish reasonable minimum requirements and standards for permits to manufacture, sell, transport, use and store explosives in the interest of the life, health and safety of employees, as well as protection of property; and to establish a schedule of fees for such permits.

### **1.2 SCOPE**

This Chapter is applicable to every person who manufactures, sells, transports, uses or stores explosives in this State.

### **1.3 EXCEPTIONS**

In cases of practical difficulty or unnecessary hardship, the Commissioner may grant exceptions from this Chapter provided that a request for such exception has been made in writing. Exceptions can only be granted when it is clearly evident that a satisfactory and safe condition is attained, but cannot be granted in any case where conflict would be created with mandatory requirements of the law.

## **SECTION 2 — DEFINITIONS**

|                     |                                                                                             |
|---------------------|---------------------------------------------------------------------------------------------|
| <b>APPROVED</b>     | Approved by the Commissioner.                                                               |
| <b>COMMISSIONER</b> | The Commissioner of the Department of Labor and Industry, or his authorized representative. |
| <b>DEPARTMENT</b>   | The Department of Labor and Industry.                                                       |

## **SECTION 3 — ANNUAL FEES FOR PERMITS**

### **3.1 GENERAL PROVISIONS**

- 3.1.1 Correct fees shall be forwarded with applications for permits.
- 3.1.2 Check or money order shall be made payable to the Commissioner of Labor and Industry.

## 3.2 SCHEDULE OF ANNUAL FEES

The following fees shall be payable for a permit to manufacture, sell, transport, use, or store explosives as indicated.

### 3.2.1 Manufacture (Quantities are per year):

|                                                                               |         |
|-------------------------------------------------------------------------------|---------|
| Not more than 500 lbs. of explosives manufactured .....                       | \$25.00 |
| Over 500 lbs. but less than 5,000 lbs. of explosives<br>manufactured .....    | 50.00   |
| Over 5,000 lbs. but less than 10,000 lbs. of explosives<br>manufactured ..... | 100.00  |
| Over 10,000 lbs. of explosives manufactured .....                             | 150.00  |

### 3.2.2 Sell:

|                                          |         |
|------------------------------------------|---------|
| Retail sale .....                        | \$10.00 |
| Wholesale, or wholesale and retail ..... | 50.00   |

### 3.2.3 Transport:

|                                                                                           |        |
|-------------------------------------------------------------------------------------------|--------|
| Per vehicle .....                                                                         | \$5.00 |
| Per vehicle operated by a person to whom no other<br>form of permit has been issued ..... | 10.00  |

### 3.2.4 Use: .....

|                                                    |        |
|----------------------------------------------------|--------|
| 3.2.4.1 Use by farmers on agricultural lands ..... | \$1.00 |
|----------------------------------------------------|--------|

### 3.2.5 Store:

|                                   |         |
|-----------------------------------|---------|
| Up to and including 100 lbs. .... | \$10.00 |
| Not more than 500 lbs. ....       | 15.00   |
| “ “ “ 1,000 lbs. ....             | 20.00   |
| “ “ “ 2,000 lbs. ....             | 25.00   |
| “ “ “ 5,000 lbs. ....             | 30.00   |
| “ “ “ 10,000 lbs. ....            | 35.00   |
| “ “ “ 20,000 lbs. ....            | 40.00   |
| “ “ “ 30,000 lbs. ....            | 45.00   |
| “ “ “ 40,000 lbs. ....            | 50.00   |
| “ “ “ 50,000 lbs. ....            | 55.00   |
| “ “ “ 75,000 lbs. ....            | 70.00   |
| “ “ “ 100,000 lbs. ....           | 85.00   |
| “ “ “ 150,000 lbs. ....           | 100.00  |
| “ “ “ 200,000 lbs. ....           | 115.00  |
| “ “ “ 250,000 lbs. ....           | 130.00  |
| “ “ “ 300,000 lbs. ....           | 145.00  |
| Over 300,000 lbs. ....            | 150.00  |

|                     |                 |         |
|---------------------|-----------------|---------|
| Up to and including | 100 caps        | \$10.00 |
| Not more than       | 1,000 caps      | 15.00   |
| " " "               | 5,000 caps      | 20.00   |
| " " "               | 10,000 caps     | 25.00   |
| " " "               | 100,000 caps    | 30.00   |
| " " "               | 200,000 caps    | 35.00   |
| " " "               | 300,000 caps    | 40.00   |
| " " "               | 400,000 caps    | 45.00   |
| " " "               | 500,000 caps    | 50.00   |
| " " "               | 1,000,000 caps  | 75.00   |
| " " "               | 5,000,000 caps  | 100.00  |
| " " "               | 20,000,000 caps | 125.00  |

#### SECTION 4 — PERMIT RESTRICTIONS

- 4.1 No person shall manufacture, sell, transport, store or use explosives unless a permit shall have been issued as herein provided, except for specific exemptions made in the Explosives Act, P. L. 1960.
- 4.2 No explosives shall be sold, given or delivered to any person not in possession of a permit.
- 4.3 No permit shall be assigned or in any way transferred.
- 4.4 No permit holder shall manufacture, sell, transport, store or use explosives except in compliance with the limitations expressed on the permit.
- 4.5 No person under twenty-one years shall be issued a permit to manufacture, sell, transport, store or use explosives.

#### SECTION 5 — PERMITS

##### 5.1 PERMIT APPLICATION

- 5.1.1 Making any false representation for the purpose of procuring a permit shall be cause for revocation.
- 5.1.2 Application for a permit shall be made to the Commissioner on forms provided by him and shall contain such information as the Commissioner may require.
- 5.1.3 Initial applications for a permit to use explosives for blasting purposes shall be accompanied by two photographs and two completed sets of fingerprint cards.

- 5.1.4 Applications for annual renewal of permits shall be mailed by the Commissioner to the permit holder's address as shown on the previous application.
- 5.1.5 If an application for renewal is filed with the Commissioner before the expiration of the old permit, the renewal shall become effective when the old permit expires. No renewal permit shall be issued more than thirty days before the expiration date.
- 5.1.6 If an application for renewal is filed after the expiration of the old permit, the effective date of the renewal shall be the date when the permit is actually issued.

## 5.2 PERMIT CLASSES

- 5.2.1 **To Manufacture:** Authorizes the manufacture, possession and storage of materials in process, development materials and finished products. It covers the purchase of explosives and ingredients for manufacture of explosives. A person having, or a person employed by a person having, a permit to manufacture explosives is not required to have a permit to use explosives where the nature of the use is incidental to manufacture or development.
- 5.2.2 **To Sell:** Authorizes the purchase, possession and sale of explosives. It is required of jobbers, wholesalers, dealers and retailers, whether or not they physically handle, store or have possession of the explosives. This permit is also required for all non-residents who desire to sell explosives within the State.
- 5.2.3 **To Transport:** Authorizes the transportation of explosives in or on any vehicle in this State. No such permit is required for transportation of explosives which is subject to, and in conformity with, the regulations of the Interstate Commerce Commission, the United States Coast Guard or the Civil Aeronautics Board.

No permit shall be required where such transportation is not on the highways. Samples of explosives for examination in a laboratory only and not intended for use or demonstration may be transported without a permit when the quantity does not exceed either one hundred blasting caps or ten pounds of other explosives.

- 5.2.4 **To Store:** Authorizes the purchase of explosives and the storage of explosives in an approved magazine within the quantities expressed on the permit. In the case of explosives storage on agricultural lands for use by farmers one permit may cover separate magazines for explosives and caps.
- 5.2.5 **To Use:** Authorizes the use of explosives for such purposes and under such conditions as are specified on the permit.

## SECTION 6 — PERMIT TO USE EXPLOSIVES

### 6.1 GENERAL PROVISIONS

- 6.1.1 **Minimum Qualifications:** The applicant for an initial permit to use explosives shall demonstrate to the satisfaction of the Commissioner that he has had adequate education, training and experience in the use of explosives in any grade authorized by the permit applied for. Before a permit to use explosives will be issued the applicant shall pass a qualifying examination given by the Commissioner. 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.
- 6.1.2 Any holder of a permit to use explosives who is convicted of a violation of the Explosives Law may be required to pass a qualifying examination as a condition to the retention of his permit.
- 6.1.3 Any person whose permit to use explosives for blasting purposes has been revoked may be required to pass a qualifying examination before the permit is reinstated.
- 6.1.4 No person shall perform any blasting operation other than that which is specified on the permit.
- 6.1.5 Any person whose permit has lapsed for a period of one year or more may be required to pass a qualifying examination before renewal.

## 6.2 USE CLASSIFICATION

| GRADE | SUB-GRADE | CATEGORY                    | DESCRIPTION                                                                                                                                                                                                                                                                                                                                                                                |
|-------|-----------|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A     | None      | Unlimited                   | All types of blasting.                                                                                                                                                                                                                                                                                                                                                                     |
| B     |           | Quarries and<br>Open pits   |                                                                                                                                                                                                                                                                                                                                                                                            |
|       | 1         | Primary                     | All primary and secondary blasting.                                                                                                                                                                                                                                                                                                                                                        |
|       | 2         | Secondary                   | Blockholing and bank and seam<br>shots only.                                                                                                                                                                                                                                                                                                                                               |
| C     | None      | Underground<br>Mines        | All phases of blasting operations in<br>underground mines.                                                                                                                                                                                                                                                                                                                                 |
| D     | None      | Tunnels and<br>Shafts       | Not applicable to tunnel and shaft<br>development in conjunction with<br>underground mining operations.                                                                                                                                                                                                                                                                                    |
| E     |           | Construction                |                                                                                                                                                                                                                                                                                                                                                                                            |
|       | 1         | General Con-<br>struction   | All general construction blasting.                                                                                                                                                                                                                                                                                                                                                         |
|       | 2         | Trenches and<br>Foundations | Trench and foundation blasting<br>only.                                                                                                                                                                                                                                                                                                                                                    |
|       | 3         | Limited<br>Quantity         | All general construction blasting<br>but limited to not more than 50<br>pounds per blast.                                                                                                                                                                                                                                                                                                  |
| F     | None      | Demolition                  | All phases of blasting in demolition<br>projects.                                                                                                                                                                                                                                                                                                                                          |
| G     | None      | Agriculture                 | Blasting on farms but limited to not<br>more than 50 pounds per blast.                                                                                                                                                                                                                                                                                                                     |
| H     | None      | Special                     | Use in research processes; or use as<br>a component part or ingredient in<br>the manufacture of any product; or<br>seismic prospecting; or well shoot-<br>ing; or test firing of articles or de-<br>vices containing explosives; or<br>other special use described on the<br>face of the permit.<br><br>A special permit entitles the holder<br>only to that use described on its<br>face. |

## **SECTION 7 — PERMIT HOLDER—DUTIES AND OBLIGATIONS**

### **7.1 PROTECTION AND EXHIBITION OF PERMITS**

- 7.1.1 Permit holders shall take every reasonable precaution to protect their permits from loss, theft, defacement, destruction or unauthorized duplication.
- 7.1.2 The loss or theft of any permit shall be reported immediately.
- 7.1.3 Permits shall be exhibited in conformity with the following provisions:
  - (a) *To manufacture:* The permit shall be posted at the plant where explosives are manufactured.
  - (b) *To sell:* Shall be posted at the location where explosives are sold; provided, however, that
    - (1) Any person who sells explosives from more than one specified location as listed on the permit shall be permitted to have a photostatic copy of the original posted at each place of business.
    - (2) Any person who sells explosives other than from a specified location within the State shall have the permit available at the place of business from which the explosives are sold.
  - (c) *To transport:* Shall be kept in the vehicle at all times.
  - (d) *To store:* The original copy shall be posted in the storage magazine, and the duplicate kept on file at the place of business.
  - (e) *To use:* Shall be in the possession of the permit holder.

### **7.2 REPORTS ON ACCIDENTS AND EXPLOSIONS**

Any explosion or fire which occurs in connection with the manufacture, sale, transportation, storage or use of explosives, shall be reported to the Department whenever there is loss of life or injury to any person, or damage to property. It is not required to report the normal testing or destroying of explosives, or blasts within barricades adequate to contain explosion.

### **7.3 THEFT OR UNLAWFUL REMOVAL**

The theft or unlawful removal of explosives shall be reported immediately to the Department by the permit holder having responsibility.

### **7.4 RECORDS OF TRANSACTIONS**

**7.4.1 General:** To make it possible at all times to know or ascertain the source and ultimate disposition of all explosives covered by the Law, all permit holders shall comply with the following:

- (a) Keep a complete record of all transactions in, or operations involving explosives until the end of the calendar year next following the year in which the transaction or operations involving explosives occurred.
- (b) An accumulation of invoices, sales slips, delivery tickets or receipts, or similar papers representing individual transactions will satisfy the requirement for complete records. Such papers shall be retained by the permit holder and furnished to the Commissioner upon request as evidence of the accuracy of the record.

#### **7.4.2 Manufacture:**

- (a) The record of a person having a permit to manufacture shall include the following information:
  - (1) The amount and kinds manufactured.
  - (2) The amounts and kinds acquired for manufacture.
  - (3) The names and addresses of the persons from whom acquired and the dates on which acquired.
  - (4) The amounts and kinds sold or otherwise disposed of.
  - (5) The names, addresses and the numbers and dates of permits, of persons to whom sold or otherwise disposed of, and the dates of the sales or other disposition.
  - (6) The amounts and kinds on hand at each location at the end of each day on which there are transactions or operations.

#### **7.4.3 Sell:**

- (a) The record of a person having a permit to sell shall include the following information:
  - (1) The amounts and kinds acquired.
  - (2) The names and addresses of the persons from whom acquired and the dates on which acquired.
  - (3) The amounts and kinds sold or otherwise disposed of.
  - (4) The names, addresses and the numbers and dates of permits of persons to whom sold or otherwise disposed of, and the dates of the sales or other dispositions. This requirement shall not apply to the sale of exempt quantities of smokeless powder.
  - (5) The amounts and kinds on hand at each location at the end of each day on which there are transactions or operations.

#### **7.4.4 Store:**

- (a) The record of a person having a storage permit shall include the following information:
  - (1) The amounts and kinds acquired.
  - (2) The names and addresses of the persons from whom acquired and the dates on which acquired.
  - (3) The amounts and kinds used, the places where used and the dates on which used.
  - (4) The amounts and kinds on hand at each location at the end of each day on which there are transactions or operations.

### **7.5 CHANGE OF ADDRESS OR OWNERSHIP**

The Department shall be notified promptly when:

- (a) The permanent address of a person who possesses a permit to use explosives is changed.
- (b) The ownership of any business possessing permits is changed.
- (c) The business address of any person possessing permits is changed.

## **SECTION 8 — EXCLUDED EXPLOSIVES**

**8.1** Permits to sell, transport, store or use any of the following excluded explosives will not be issued:

- (a) Liquid nitroglycerine.
- (b) Dynamite, except gelatine dynamite, containing over sixty percent of liquid explosives ingredient.
- (c) Dynamite having an unsatisfactory absorbent, or one that permits leakage of a liquid explosive ingredient under any condition liable to exist during storage.
- (d) Fulminate of mercury in bulk in a dry condition and fulminate of all other metals in any condition except as a component part of manufactured articles not hereinafter forbidden.
- (e) Explosives compositions that ignite spontaneously or undergo marked decomposition when subjected for forty-eight consecutive hours or less to a temperature of seventy-five degrees Centigrade.
- (f) Explosives condemned by the commissioner.
- (g) Explosives not packed or marked in accordance with the requirements of the Interstate Commerce Commission.
- (h) Explosives containing an ammonium salt and a chlorate.

**8.2** In any action taken by the Commissioner regarding 8.1, he shall be guided by the recommendations of:

- (a) The Bureau of Explosives of the American Association of Railroads.
- (b) United States Bureau of Mines.

## **SECTION 9 — REVOCATION OF PERMITS**

**9.1** A permit for the sale, transportation, storage or use of explosives may be revoked by the Commissioner for any of the following reasons:

- (a) Non-compliance with any order issued by the Commissioner within the time specified in such order.
- (b) Proof that the permit holder has been convicted of a misdemeanor or high misdemeanor.

- (c) Proof that a permit holder is disloyal to the United States.
- (d) Violation by the permit holder of the terms specified on the permit, or essential changes in the conditions under which the permit was issued.
- (e) Violation by the permit holder of any of the provisions of the Explosives Law.

## **9.2 PROCEDURE**

9.2.1 In any case where the Commissioner revokes a permit, he shall notify the permit holder of the revocation. Said notice shall state:

- (a) The specific charges upon which the revocation is based;
- (b) That upon written request a hearing before the Commissioner will be held within ten days after the date of the revocation.

9.2.2 If the hearing is held before the Commissioner he shall state his findings and conclusions in writing and transmit a copy to the permit holder.

## **9.3 SURRENDER OF REVOKED PERMIT**

Upon notice of the revocation of any permit the permit holder shall immediately surrender to the Commissioner the permit revoked and all copies thereof.

# **N. J. A. C. 12:191**

(SAFETY REGULATION No. 21)

*Governing*

## **THE TRANSPORTATION OF EXPLOSIVES**

*Effective December 14, 1962*

STATE OF NEW JERSEY  
DEPARTMENT OF LABOR & INDUSTRY  
BUREAU OF ENGINEERING & SAFETY  
TRENTON, NEW JERSEY

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## **SECTION 1 — PURPOSE AND SCOPE**

### **1.1 PURPOSE**

This Regulation is promulgated to establish reasonable minimum requirements and standards for the transportation of explosives in the interest of the life, health and safety of employees and the public, as well as the protection of property.

### **1.2 SCOPE**

This Chapter is applicable to transportation equipment and its operation when such equipment is engaged in the transportation of explosives. Excluded from the scope of this Chapter is the transportation of explosives under the jurisdiction of and in conformity with the requirements of the Interstate Commerce Commission or the United States Coast Guard or the Civil Aeronautics Board.

### **1.3 EXCEPTIONS**

1.3.1 In cases of practical difficulty or unnecessary hardship, the Commissioner may grant exceptions from the requirements of this Chapter, provided that a request for such exception has been made in writing. Exceptions can only be granted when it is clearly evident that a satisfactory and safe condition is attained, but cannot be granted in any case where conflict would be created with mandatory requirements of the law.

1.3.2 Nothing in this Chapter shall apply to the receipt, possession and use of signals required for the safe operation of vessels, motor vehicles, railroad cars, or aircraft by the operators of such vessels, motor vehicles, railroad cars or aircraft.

## **SECTION 2 — DEFINITIONS**

### **APPROVED**

Approved by the Commissioner.

### **CAR**

An ore car, truck, or any other wheeled conveyance for use on railroads in a mine or tunnel, whether hand trammed or included in a train.

COMMISSIONER

The Commissioner of Labor and Industry, or his authorized representative.

DEPARTMENT

The Department of Labor and Industry.

TUNNEL

An underground passageway, excavated by men and equipment working below the earth's surface, that provides a subterranean route along which men, equipment or substances can move, other than passageways excavated by mine or quarry operators in connection with such operations.

### SECTION 3 — GENERAL PROVISIONS

#### 3.1 COMPLIANCE

All transportation of explosives shall comply with the requirements of this Chapter.

#### 3.2 EXCLUDED EXPLOSIVES

Excluded explosives, as listed in 8.1 of Chapter 190, Explosives Permits and Fees of Title 12, N.J.A.C.

#### 3.3 RESTRICTIONS

- 3.3.1 A motor vehicle with passenger car registration shall not be used for the transportation of explosives; provided, however, a permit may be issued in accordance with 1.3.1.
- 3.3.2 It is prohibited for any person to deliver any explosives to any person not in possession of a valid permit to manufacture, store, sell, transport or use explosives.
- 3.3.3 No motor vehicle shall be used to transport explosives unless a permit for such motor vehicle has been issued by the Commissioner, provided, however, that no permit shall be required for any motor vehicle operating within the confines of an explosives manufacturing establishment, mine or quarry. Such transportation, however, shall otherwise be in conformity with this Chapter.

### **3.4 ACCIDENTS, FIRES AND EXPLOSIONS**

All accidents, fires and explosions, occurring in connection with the transportation of explosives shall be reported at once to the State Police and the Department by telephone, and be supplemented by a detailed written report to the State Police or Department.

### **3.5 QUANTITY LOADED ON MOTOR VEHICLE**

No quantity of explosives in excess of the limitations expressed on the permit to transport explosives shall be loaded or transported on the vehicle.

### **3.6 PERMITS**

- 3.6.1 Requirements concerning permits are set forth in Chapter 190, Explosives Permits and Fees of Title 12, N.J.A.C.
- 3.6.2 The permit to transport explosives shall be kept on the motor vehicle at all times when explosives are being transported.
- 3.6.3 No permit shall be required for the transportation of laboratory samples when the samples conform to 4.12.7.

### **3.7 RADIO TRANSMISSION**

The owner or operator of any motor vehicle equipped with a radio transmitter which is licensed for the transportation of explosives shall:

- (a) Have a notice posted in the cab of the motor vehicle stating that the transmitter is to be turned off when explosives are being loaded, unloaded or transported.
- (b) Turn off the transmitter when explosives are being loaded, unloaded or transported.

## **SECTION 4 — SURFACE TRANSPORTATION**

### **4.1 GENERAL**

- 4.1.1 No person shall place or carry or cause to be placed or carried in the bed or body of any motor vehicle containing explosives, any metal tools, sparking metal, carbides, oils, matches, firearms, electric storage batteries, flammable substances, acids, corrosive compounds, or other devices which can produce spark, flame or heat.

4.1.2 The provisions of 4.1.1 shall:

- (a) Not apply to tools used for the operation and repair of such vehicle when in a compartment separate from the loading space.
- (b) Not be construed as prohibiting the transportation of detonators in or upon the same vehicle with other explosives, when in compliance with 4.3.

## **4.2 RESTRICTIONS**

- 4.2.1 No portable magazine or explosive container shall be transported in any open-bodied vehicle without being securely attached to the body of the vehicle.
- 4.2.2 No explosives shall be transported in any form of full trailer, nor shall any trailer be attached to a vehicle transporting explosives. This provision shall not apply to semi-trailers.

## **4.3 DETONATORS AND OTHER EXPLOSIVES IN SAME VEHICLE**

4.3.1 Detonators may be transported in a vehicle with other explosives only as follows:

- (a) The detonators shall be packed in approved Interstate Commerce Commission outside shipping containers or in prescribed inside I.C.C. packages.
- (b) The detonators shall be kept in an outside box made of one inch lumber lined with padding material not less than  $\frac{1}{2}$  inch thick, or in an approved portable magazine.
- (c) When placed in closed body vehicles used exclusively for the transportation of explosives, detonators and other explosives may be transported together only in conformity with I.C.C. regulations and specifications.

4.3.2 When detonators are placed in a container or portable magazine, in accordance with 4.3.1 the container or portable magazine shall:

- (a) Be placed at the opposite end of the vehicle from the other explosives.
- (b) If placed in the same container they shall be separated from the other explosives by a solid partition at least 6 inches thick.

#### **4.4 QUANTITIES OF EXPLOSIVES**

- 4.4.1 No quantity of explosives in excess of 30,000 pounds shall be transported in any one vehicle at any one time.
- 4.4.2 Detonators may be transported in the same vehicle with explosives provided the aggregate weight of explosives, as defined in the law does not exceed 5,000 pounds.

#### **4.5 CONSTRUCTION**

- 4.5.1 A vehicle used for the transportation of explosives shall:
  - (a) Be capable of safely carrying the load placed upon it.
  - (b) Be in good operating condition.
  - (c) Not be loaded beyond its capacity.
  - (d) Have floors which are tight and substantial.
  - (e) Have any exposed ferrous metal on the inside of the body that might come in contact with any package of explosives covered with wood or other non-sparking material.
- 4.5.2 No open body or rack-type body vehicle shall be used for the transportation of explosives unless:
  - (a) The vehicle is used on mine or quarry owned property, or other privately owned property and does not traverse a public highway, or
  - (b) The vehicle is equipped with approved containers for holding the explosives.
- 4.5.3 Where open-body vehicles are permitted in accordance with 4.5.2(a):
  - (a) The explosives containers shall not be stacked higher than closed sides of the body.
  - (b) The explosives shall be covered with a fire-resistant tarpaulin or other suitable material.
  - (c) All sides of the body shall be strongly made and securely fastened.
  - (d) The tail-gate shall be closed and secured in place.
- 4.5.4 All vehicles shall be equipped with a reliable system of brakes on all wheels.

- 4.5.5 Such system of brakes shall include effective means for emergency application of brakes so that failure of any part of the service brake system will not leave the vehicle without brakes to stop and hold such vehicle.
- 4.5.6 The battery and wiring of a vehicle shall be so located that neither will come in contact with any package of explosives.
- 4.5.7 All electrical wiring of a vehicle shall be completely insulated and securely fastened to prevent short-circuiting.
- 4.5.8 All portions of the fuel-feed system shall be so constructed, located and free from leaks as to minimize a fire hazard.
- 4.5.9 The fill pipe or fill connection of any fuel tank shall be so located and arranged that fuel will not be spilled on any portion of the exhaust system in the event of overflow during the filling process.
- 4.5.10 With the exception of lights necessary for the operation of the vehicle, no type of lighting shall be used in or about a vehicle containing explosives except portable electric floodlights or electric lanterns.
- 4.5.11 The exhaust system of a vehicle shall be constructed and installed in a workmanlike manner, and in no case exposed to the accumulation of grease, oils, gasoline or other fuels.
- 4.5.12 The chassis, engine, pan and bottom of the body of a motor vehicle shall be clean and free from excess oil and grease.

#### **4.6 SIGNS AND MARKINGS**

- 4.6.1 Any vehicle when transporting explosives, shall be marked or placarded in one of the following ways:
  - (a) The word "Explosives" painted on both ends and each side of the vehicle in letters at least 6 inches in height in colors contrasting with the background.
  - (b) A placard with the word "Explosives" on both ends and each side of the vehicle in letters at least 6 inches in height in colors contrasting with the background.
- 4.6.2 The required marking shall be removed from, or covered on any vehicle to which it is attached or affixed when such vehicle is not transporting explosives.

- 4.6.3 When any vehicle transports explosives at night, the explosives marking or placard shall conform with 4.6.1 and in addition shall be constructed of reflecting material so as to be legible for at least 300 feet when opposed by a motor vehicle displaying undimmed headlights at night on an unlighted highway.

#### **4.7 ACCESSORIES**

- 4.7.1 Every commercial vehicle used for transporting explosives shall be equipped with a minimum of two fire extinguishing units from the following groups:
- (a) Two five pound or larger carbon dioxide extinguishers.
  - (b) Two four pound or larger dry chemical extinguishers.
- 4.7.2 Fire extinguishers shall be:
- (a) Filled and ready for immediate use.
  - (b) Examined periodically by a competent person.
  - (c) Placed where readily accessible, one of which shall be in the cab of the vehicle.
- 4.7.3 Three I.C.C. approved red electric lanterns or reflectors and three red warning flags shall be carried on a vehicle transporting explosives, but not in the portion of the body in which explosives are being carried.
- 4.7.4 Any vehicle transporting explosives at night shall, in addition to 4.7.3 be equipped with one electric flashlight or one electric lantern.

#### **4.8 INSPECTION**

- 4.8.1 It shall be the duty of the person to whom a permit to transport explosives has been issued, or the operator of the vehicle to inspect the following each day the vehicle is being used to transport explosives:
- (a) Fire extinguishers are filled and in working order.
  - (b) All electrical wiring is completely protected and securely fastened to prevent short-circuiting.
  - (c) Fuel tank and feed lines are secure and have no leaks.

- (d) Chassis, engine, pan and underside of body are clean and free from surplus oil and grease.
  - (e) Brakes, lights, horn, windshield wiper and steering apparatus are functioning properly.
  - (f) Tires are properly inflated and have no defects.
  - (g) Three I.C.C. approved red electric lanterns or reflectors, three red warning flags are packed and ready for use.
  - (h) Vehicle is in proper condition in every other respect and acceptable for handling explosives.
- 4.8.2 It shall be the duty of the person to whom a permit to transport explosives has been issued to:
- (a) Maintain a record card of daily vehicle inspections:
  - (b) Indicate by a check mark that all items listed in 4.8 have been inspected on each day the vehicle is used to transport explosives.
  - (c) Keep the record card in the vehicle at all times when explosives are being transported.
  - (d) Retain the record card for a period of one calendar month after the date of the last inspection and entry.

## **4.9 OPERATION**

- 4.9.1 No person other than the driver or his authorized helper or helpers shall ride in or upon any vehicle containing explosives.
- 4.9.2 In no event shall the number of persons riding in a vehicle containing explosives exceed three.
- 4.9.3 No person shall be permitted to approach, ride upon, drive, load or unload a vehicle while smoking or while under the influence of an intoxicant or narcotics.
- 4.9.4 When feasible, the transportation of explosives shall be done during daylight hours.
- 4.9.5 All vehicles transporting explosives shall come to a full and complete stop before:
  - (a) Crossing any railroad track.
  - (b) Entering upon any main highway.

- 4.9.6 All vehicles transporting explosives shall travel and remain at least 500 feet from any other vehicle carrying explosives moving in the same direction.
- 4.9.7 No vehicle transporting explosives shall be driven past fires burning on or near the highway until after due caution shall have been taken to ascertain that such passing can be made with safety.
- 4.9.8 No explosives shall be transferred, except in case of extreme emergency from one container to another on any highway or from one vehicle to another on any highway. When necessary to make such a transfer, the person in charge of the vehicle shall set out red electric lanterns, or reflectors and flags and take all necessary means to protect and warn the other vehicles on the highway.
- 4.9.9 Vehicles transporting explosives shall always be kept in gear, and shall not exceed the posted legal speed limit for trucks.
- 4.9.10 No person in charge of a vehicle containing explosives shall:
- (a) Allow such vehicle to remain unattended except only in an emergency.
  - (b) Permit such vehicle to enter or be taken to a public garage or repair shop for storage or repair.
  - (c) Fill or permit the gasoline tank of the vehicle to be filled except when necessary to refuel enroute, and then only when the engine is not running.
  - (d) Leave the vehicle unless the brakes are securely set, and the motor is stopped.
  - (e) Make any repairs on such vehicle except in cases where repairs can be made without hazard.
  - (f) Park on any public street adjacent to or in proximity to any bridge, tunnel, dwelling, building or place where persons work, congregate, or assemble, unless engaged in making deliveries or where the necessities of operations make such prohibitions impracticable.
- 4.9.11 Vehicles transporting explosives shall, whenever possible, avoid congested areas and heavy traffic.

#### **4.10 DRIVER QUALIFICATIONS**

Vehicles containing explosives shall be driven by, and be in charge of a competent, reliable and experienced driver, who shall:

- (a) Be in possession of a valid driver's license.
- (b) Be at least 21 years of age.
- (c) Be able to read and write the English language.
- (d) Not be addicted to the use of, or under the influence of intoxicants or narcotics.
- (e) Be familiar with the requirements governing the transportation of explosives.

#### **4.11 LOADING AND UNLOADING**

4.11.1 No bale hooks or metal hooks shall be used for the loading, unloading or other handling of explosives.

4.11.2 Cases of explosives shall not be dropped, slid or otherwise roughly handled.

4.11.3 Motors of vehicles containing explosives shall be stopped, brakes set and wheels blocked when parked on an incline before loading or unloading explosives.

4.11.4 Containers of explosives shall not be placed immediately in back of or in close proximity to the exhaust of the motor vehicle.

4.11.5 Explosives shall be so loaded on the vehicle that there is no danger of the explosives falling from the vehicle.

#### **4.12 SAMPLES**

4.12.1 New explosives and explosive devices, other than Army, Navy or Air Force explosives or chemical ammunition of a security classification, shall be examined and approved by the Commissioner as safe for transportation before being offered for shipment, except that a sample of such explosives, fireworks or explosives devices, not to exceed 5 pounds net weight, may be offered for transportation for this examination.

4.12.2 Before being offered for shipment, explosives articles in the experimental state shall be made safe by removal of the ignition elements, or otherwise made safe.

- 4.12.3 Shipments of samples of explosives, and explosives devices shall be packed, marked and described as required by 4.12.5, 4.12.6, 4.12.7 and 4.12.8.
- 4.12.4 Samples of explosives (except liquid nitroglycerin) including explosive devices for examination in a laboratory only, and not intended for use or demonstration may be transported in a vehicle, providing that the following requirements are met:
- (a) Not more than 100 detonators may be shipped in one outside package for laboratory examination and they shall be packed, marked and described as provided in 4.12.6.
  - (b) Not more than 10 pounds of explosives for laboratory examination may be packed on one outside package or transported in a vehicle at one time.
- 4.12.5 The net weight of the explosives contents shall be plainly marked on the outside of each box of samples being transported.
- 4.12.6 Each outside package containing samples of explosives for laboratory examination shall have securely and conspicuously attached to it a square red label, as described herein:
- (a) Labels shall be square measuring 4 inches on each side and bright red in color. Printing shall be in black letters inside of a black line border measuring  $3\frac{1}{2}$  inches on each side, and as shown herein:



#### 4.12.7 Samples of the explosive shall:

- (a) Be packed in well secured metal, glass or plastic containers, or in strong water proof paper or cardboard inside packages.
- (b) Consist of not more than one-half pound sample in each inside container.
- (c) Have the inside package placed in sawdust or similar cushioning material at least 2 inches thick, in a wooden box.

#### 4.12.8 Whenever a sample of explosives are contained in a metal envelope or receptacle, the sample shall:

- (a) Be properly cushioned with a sawdust or similar cushioning material in a strong wooden box.
- (b) Have the inside box packed in a wooden box with at least 2 inches of cushioning material separating the boxes.

## SECTION 5 — MINES AND TUNNELS

### 5.1 SURFACE TRANSPORTATION

#### 5.1.1 Any vehicle transporting explosives within the limits of a mining property or tunnel project shall:

- (a) Not require a permit to transport explosives, if the vehicle does not enter upon a public highway.
- (b) Be in compliance with all the provisions of Section 1.

#### 5.1.2 The transfer of explosives from surface storage places shall be so arranged that no undue delay will occur between the time the explosives leave the surface storage magazine and the time they are properly stored in the mine, or distributed for use in the mine or tunnel.

### 5.2 UNDERGROUND TRANSPORTATION—GENERAL

#### 5.2.1 Explosives shall not be left at any level station or near the shaft collar or mine entrance, but shall be taken to the place of use or storage without delay.

5.2.2 The quantity of explosives carried to the face of any tunnel or mine working place shall not exceed the amount estimated to be necessary for the blast.

5.2.3 Explosives in transit shall not be left unattended.

### **5.3 HOISTING OR LOWERING OF EXPLOSIVES**

5.3.1 The hoistman shall be notified before explosives are transported in the shaft conveyance.

5.3.2 No person shall ride in any shaft conveyance containing explosives.

5.3.3 Detonators and other explosives shall not be transported at the same time on any shaft conveyance.

5.3.4 Explosives shall not be hoisted or lowered in the same shaft conveyance with other materials, supplies or equipment unless in a powder car.

5.3.5 All hoisting and lowering of ore, muck or other materials in other shaft compartments shall be permitted while hoisting or lowering explosives, provided:

(a) The hoisting compartments are enclosed, or

(b) The explosives being hoisted or lowered are in an adequately enclosed shaft conveyance.

### **5.4 UNDERGROUND RAILROAD**

5.4.1 No employees, except the train crew and powder man shall be permitted to ride on a train transporting explosives.

5.4.2 No explosives of any kind shall be transported on any locomotive.

5.4.3 No explosives shall be transported on a man-trip.

5.4.4 If 100 pounds or more of explosives are to be transported at one time into a tunnel, a powder car or cars shall be provided.

5.4.5 The car or cars containing explosives shall be pulled and not pushed by the locomotive.

5.4.6 The car shall be especially built for the purpose, and shall be kept locked except when necessarily opened for the placing or removing of explosives.

- 5.4.7 The compartment or compartments shall be electrically insulated from the metal frame of the car and possible contact with conductors on the ends, top and sides.
- 5.4.8 Each side of the powder car shall bear a sign with the word "Explosives" in letters not less than four inches in height upon a background of sharply contrasting color.
- 5.4.9 Compartments for transporting detonators and explosives in the same car shall be separated by a distance of at least twenty-four inches, or by a solid partition of at least six inches thick.
- 5.4.10 When the explosives car is being transported by a trolley locomotive, at least two cars shall be placed between the explosives car and the locomotive, and an electrically insulated coupling or drawbar shall be used between the explosives car and the first car.

## **5.5 UNDERGROUND—TRACKLESS**

- 5.5.1 Trackless vehicles used for the transportation of explosives shall comply with Section 4.
- 5.5.2 No employees except the vehicle operator and powder man shall be permitted to ride on any vehicle transporting explosives.
- 5.5.3 Drivers of other trackless vehicles shall be notified in advance when explosives are being transported on roads or haulage ways over which such drivers operate.
- 5.5.4 Trackless vehicles which are transporting explosives shall not contain rock, ore or other materials except those used in blasting.
- 5.5.5 Truck type vehicles used for the transportation of explosives shall be equipped with a red light on the front.
- 5.5.6 Trackless vehicles used to transport explosives shall be truck type vehicles other than those with dump bodies.

## **5.6 MANUAL TRANSPORTATION**

- 5.6.1 Explosives that are being transported manually from one place to another in the mine and are not in the original container, shall be placed in suitable bags or other containers for such transportation.

- 5.6.2 When transporting explosives manually, detonators and primers shall be transported in separate bags or containers from other explosives.

## **SECTION 6 — RAILROADS**

### **6.1 GENERAL**

- 6.1.1 No person shall have or keep explosives in a railway car unless said car and contents and methods of loading meet the requirements of the Interstate Commerce Commission Regulations for the Transportation of Explosives.
- 6.1.2 Any explosives at a railroad facility, whether for delivery to a consignee or to be forwarded to some other destination, shall be kept in a safe place, isolated as far as practicable and in such a manner that they can be easily and quickly removed.
- 6.1.3 Explosives shall not be delivered to, or received from any railway station between the hours of sunset and sunrise, except by special permission from the Commissioner.

### **6.2 NOTIFICATION UPON ARRIVAL OF EXPLOSIVES**

When explosives are brought by rail into any municipality, except at an explosives manufacturing plant in said municipality, for delivery to an intermediate receiver, consignee's agent or consignee, or to be forwarded to some other destination, the carrier performing the shipment shall immediately notify the consignee of the arrival of the explosives.

### **6.3 REMOVAL OF EXPLOSIVES**

- 6.3.1 If the consignee does not receive and remove the explosives from the possession of the carrier within 48 hours (Sundays and holidays excluded) after such notification, then the railroad shall:
- (a) Remove the explosives from the municipality, or
  - (b) Remove the explosives to a properly permitted magazine.
- 6.3.2 Any person having been notified, as consignee, of a shipment of explosives being in the hands of any railroad, shall remove

the explosives within 48 hours (Sundays and holidays excluded) to some place meeting the requirements of the Explosives Law and Regulations.

#### **6.4 DISPOSITION OF DAMAGED EXPLOSIVES**

The handling, repacking and disposition of damaged explosives shall conform to the requirements of Tariff No. 13, Interstate Commerce Commission Regulations, issued September 15, 1960.

#### **6.5 HANDLING RAILROAD CARS OF EXPLOSIVES**

The handling of cars containing explosives in railroad yards shall conform to the requirements of Tariff No. 13, Interstate Commerce Commission Regulations, issued September 15, 1960.

#### **6.6 PLACARDING OF RAILROAD CARS**

6.6.1 Every railroad car containing explosives which has reached its destination, or is stopped in transit so as no longer to be in Interstate Commerce, shall have attached to both sides and ends of the car, placards with the words "EXPLOSIVES—HANDLE CAREFULLY—KEEP FIRE AWAY" in red letters.

6.6.2 All placards shall be removed after the railroad car has been unloaded.

#### **6.7 UNLOADING AND LOADING OF RAILROAD CARS**

6.7.1 Railroad cars containing explosives shall be so placed that they will be safe from all probable danger of fire.

6.7.2 All dry leaves, dry grass, trash and debris should be removed for a distance of at least 25 feet from cars containing explosives.

6.7.3 When railroad cars are opened, all seals shall be retained and a record made of the seal numbers.

6.7.4 Between trips of unloading or loading a railroad car, the railroad car shall be locked or guarded.

6.7.5 When unloading or loading in railroad yards with parallel tracks on both sides of the railroad car, the doors shall be kept closed when steam locomotives are passing or are near the car.

- 6.7.6 Any railroad car which has contained black powder, shall be swept out, and the sweepings destroyed by throwing into water.
- 6.7.7 The railroad company shall be notified as soon as a railroad car has been loaded or unloaded.

## **SECTION 7 — VESSELS**

### **7.1 GENERAL**

- 7.1.1 No explosives shall be received at any pier, wharf or harbor facility for import or export unless permission has first been obtained from the Commissioner.
- 7.1.2 No explosives shall be delivered to any pier, wharf or harbor facility for use in the waters of the State unless permission has first been obtained from the Commissioner.
- 7.1.3 No explosives shall be carried or transported on the waters of the State on any vessel which is carrying passengers for hire.

### **7.2 MARKING OF VESSELS**

- 7.2.1 Any vessel transporting explosives shall display on a suitable staff an International Code Flag B, readily discernible from a distance of not less than 1,000 feet by day, and which shall be properly illuminated at night.
- 7.2.2 Any vessel when transporting explosives shall be marked or placarded in one of the following ways:
  - (a) The word "EXPLOSIVES" painted on both sides and the stern of the vessel in letters at least 6 inches in height in colors contrasting with the background.
  - (b) A placard with the word "EXPLOSIVES" placed on both sides and the stern of the vessel in letters at least 6 inches in height in colors contrasting with the background.
- 7.2.3 The required marking shall be removed from, or covered on any vessel to which it is attached or affixed when such vessel is not transporting explosives.

### **7.3 REFLECTIVE SIGNS**

When any vessel transports explosives at night, the explosives marking or placard shall conform with 7.2.2, and in addition shall be constructed of reflecting material adequate to be legible at 300 feet.

### **7.4 ACCESSORIES**

Every vessel transporting explosives shall be equipped with at least two efficient fire extinguishers of adequate size to capably deal with gasoline or oil fires.

### **7.5 SMOKING**

No smoking shall be permitted on any vessel transporting explosives except in designated areas.



# **N. J. A. C. 12:192**

(SAFETY REGULATION No. 22)

*Governing*

## **THE STORAGE OF EXPLOSIVES**

*Effective August 20, 1965*

STATE OF NEW JERSEY  
DEPARTMENT OF LABOR & INDUSTRY  
BUREAU OF ENGINEERING & SAFETY  
TRENTON, NEW JERSEY

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## **SECTION 1 — PURPOSE AND SCOPE**

### **1.1 PURPOSE**

This Regulation is promulgated to establish reasonable minimum requirements and standards for the storage of explosives in the interest of the life, health and safety of the employees and the public, as well as the protection of property.

### **1.2 SCOPE**

This Chapter is applicable wherever explosives are stored.

### **1.3 EXCEPTIONS**

In cases of practical difficulty or unnecessary hardship the Commissioner may grant exceptions from this Chapter provided that a request for such exemption has been made in writing. Exceptions can only be granted when it is clearly evident that a satisfactory and safe condition is attained, but cannot be granted in any case where conflict would be created with mandatory requirements of the law.

## **SECTION 2 — DEFINITIONS**

### **APPROVED**

Approved by the Commissioner.

### **ARTIFICIAL BARRICADE**

An artificial mound or properly revetted wall of earth of a minimum thickness of 3 feet at the top.

### **BARRICADED**

That a building containing explosives is effectively screened from a magazine, inhabited building, railway or highway, either by a natural barricade or by an artificial barricade of such height that a straight line from the top of any sidewall of a building containing explosives to the eave line of any magazine or inhabited building, or to a point 12 feet above the center of a railway or highway, will pass through such intervening natural or artificial barricade.

|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BLASTING CAP                   | A shell closed at one end and containing a detonating charge which is ignited by flame or spark from safety fuse.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| COMMISSIONER                   | The Commissioner of Labor and Industry, or his authorized representative.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| DELAY ELECTRIC<br>BLASTING CAP | An electric blasting cap with a delay timing element interposed between the ignition element and the detonating charge.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| DEPARTMENT                     | Department of Labor and Industry.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| DETONATING FUSE                | A fuse containing a core of high explosives of sufficient strength to detonate other high explosives lying alongside and to explode the entire charge.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| DETONATOR                      | Any device used for the purpose of initiating an explosive charge and shall include, but is not limited to, blasting caps, electric blasting caps or delay-electric blasting caps.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| ELECTRIC BLASTING<br>CAP       | A shell containing a charge of detonating compound designed to be ignited by an electric current passed through the two insulated leg wires that project through the seal of the shell.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| EXPLOSIVES                     | Any chemical compound or mixture that is commonly used or intended for the purpose of producing an explosion, that contains any oxidizing and combustible materials or other ingredients, in such proportions, quantities or packing that an ignition by fire, by friction, by concussion or by detonation of any part of the compound or mixture may cause such a sudden generation of highly heated gases that the resultant gaseous pressures are capable of producing destructive effects on contiguous objects. The term "explosives" shall include, but is not limited to commercial explosives, propellants and nitro-carbo-nitrates. The term "explosives" except as specifically stated in this act, shall not include small arms |

|                                              |                                                                                                                                                                                                                                                                                                                                 |
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|                                              | ammunition, explosives in the form prescribed by the official United States Pharmacopoeia, or fireworks regulated under Revised Statutes Sections 21:2-1 through 21:2-7.                                                                                                                                                        |
| EXPLOSIVES MANUFACTURING BUILDING            | Any building or other structure, except magazines, in which the manufacture of explosives is carried on.                                                                                                                                                                                                                        |
| EXPLOSIVES<br>MANUFACTURING<br>ESTABLISHMENT | All lands, and buildings situated thereon, used in connection with the manufacture of explosives.                                                                                                                                                                                                                               |
| FUSE LIGHTERS AND<br>FUSE IGNITERS           | Special devices designed for the purpose of igniting safety fuse.                                                                                                                                                                                                                                                               |
| HIGHWAY                                      | Any public street, road, highway, alley or those parts of navigable streams which are used as highways of commerce.                                                                                                                                                                                                             |
| IGNITER CORD                                 | An external burning medium by which fire is conveyed at a continuous and uniform rate for the purpose of igniting safety fuse.                                                                                                                                                                                                  |
| INHABITED BUILDING                           | A building regularly occupied in whole or in part as a habitation for human beings, or any church, schoolhouse, railroad station, store or other structure where people are accustomed to assemble, except any building or structure occupied in connection with the manufacture, transportation, storage or use of explosives. |
| MAGAZINE                                     | Any building or structure used for the storage of explosives, but shall not mean an explosives manufacturing building.                                                                                                                                                                                                          |
| NATURAL BARRICADE                            | Natural features of the ground including, but not limited to, hills, or timber of sufficient density so that the surrounding exposures which may require protection cannot be seen from the magazine containing explosives when the trees are bare of leaves.                                                                   |
| NITRO-CARBO-NITRATE                          | A mixture intended for blasting, consisting substantially of inorganic nitrates and car-                                                                                                                                                                                                                                        |

|                          |                                                                                                                                                                                                                                                                                                                                                   |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                          | bonaceous combustibles in which none of the ingredients is a commercial explosive.                                                                                                                                                                                                                                                                |
| PROPELLANTS              | Solid chemicals or solid chemical mixtures, which function by rapid combustion of successive layers, and include, but are not limited to, smokeless powder for small arms, smokeless powder for cannon, smokeless powder or solid propellants for rockets, jet thrust units, or other devices.                                                    |
| PUBLIC CONVEYANCE        | Any transportation facility which is carrying passengers for hire.                                                                                                                                                                                                                                                                                |
| RAILWAY                  | Includes any steam, electric or other railroad or railway which carries passengers for hire on the particular line or branch in the vicinity where explosives storage magazines or explosives manufacturing buildings are situated, but shall not include auxiliary tracks, spurs, sidings installed and primarily used for transporting freight. |
| SAFETY FUSE              | An internal burning medium through which fire is conveyed at a continuous and uniform rate for the purpose of firing explosives.                                                                                                                                                                                                                  |
| SMALL ARMS<br>AMMUNITION | Any cartridge or shell for use in a pistol, rifle or shotgun, and including ball, shot or blank cartridges or shells.                                                                                                                                                                                                                             |
| SQUIBS - ELECTRIC        | Similar in appearance to a blasting cap which upon firing by an electric current provides an intense heat instead of a detonation.                                                                                                                                                                                                                |

## SECTION 3 — GENERAL REQUIREMENTS

### 3.1 COMPLIANCE

All storage of explosives shall comply with the requirements of this Chapter.

### 3.2 EXCLUDED EXPLOSIVES

Excluded explosives, as listed in 8.1 of Chapter 190, Explosives Permits and Fees of Title 12, N.J.A.C. shall not be stored except at an explosives manufacturing plant.

### **3.3 EXEMPTIONS**

This Chapter shall not be construed as applying to the following when used for the purpose for which they are intended:

- (a) Small arms ammunition.
- (b) Explosive power-packs in the form of explosive cartridges.
- (c) Explosive—charged construction devices such as:
  - (1) Explosive rivets.
  - (2) Explosive bolts.
  - (3) Explosive charges for driving pins or studs.
  - (4) Cartridges for explosive—actuated power tools.
- (d) Lighting devices which do not function by explosion:
  - (1) Fuse lighters and fuse igniters.
  - (2) Safety fuse.
  - (3) Igniter cord.
  - (4) Instantaneous fuse.
- (e) Model rocket engines shall not be subject to this Chapter but the requirements for these are expressed in Chapter 194, Rocket Experimentation by Amateurs of Title 12, N.J.A.C.

### **3.4 RESTRICTIONS**

- 3.4.1 No person unless authorized by the owner of the explosives shall have access to or enter magazines.
- 3.4.2 Every person storing or in possession of explosives shall be required to have a permit for each magazine used for the storage of explosives.
- 3.4.3 All explosives except those in the process of manufacture, or being transported, or used, shall be stored in a magazine complying with the requirements of this Chapter.
- 3.4.4 Any magazine in which explosives are stored, shall not be used for the storage of other material, except that ammonium nitrate may be stored with explosives. When so stored, the combined quantity of all materials shall be classified as explosives.
- 3.4.5 All magazines shall be kept locked except during the time of placement and removal of stocks of explosives.

### **3.5 FIRES, EXPLOSIONS, THEFT OR PROPERTY DAMAGE**

Any accidental fire, explosion, property damage, or theft occurring in connection with the storage of explosives shall be reported at once to the Bureau of Engineering and Safety by telephone, and be supplemented by a detailed report.

### **3.6 QUANTITY STORED IN MAGAZINE**

No quantity of explosives in excess of the limitations expressed on the permit to store shall be stored in any magazine.

### **3.7 OVERNIGHT STORAGE**

No explosives shall be stored overnight in a Class 3 magazine.

### **3.8 PERMITS**

3.8.1 Requirements concerning permits are set forth in Chapter 190, Explosives Permits and Fees of Title 12, N.J.A.C.

3.8.2 The original copy of the permit to store explosives shall be posted in the storage magazine at all times, and the duplicate kept on file at the place of business.

### **3.9 NOTIFICATION TO MUNICIPALITIES**

3.9.1 Upon receipt of a permit to store explosives in a Class 1, 2 or 4 magazine, the permittee shall notify the Chief of the Fire Department.

3.9.2 The notification shall include:

- (a) The location of the magazines.
- (b) The maximum quantity of explosives authorized to be stored in the magazines.
- (c) The type of explosives stored.

3.9.3 The permittee shall notify the Chief of the Fire Department upon removal of the magazines or upon any change in the original permit.

### **3.10 SMOKING AND OPEN FLAMES**

Smoking, matches, open flames and spark producing devices, except as provided in 3.18, shall not be permitted in, or within 100 feet of any magazine containing explosives.

### **3.11 MAGAZINE REPAIRS**

- 3.11.1 When magazines require inside repairs, all explosives shall be removed therefrom and the floors cleaned.
- 3.11.2 In making outside repairs if there is a possibility of causing sparks or fire, the explosives shall be removed.
- 3.11.3 When explosives are removed from the magazine while repairs are being accomplished, the explosives shall:
  - (a) Be placed in another magazine, or
  - (b) Be placed a safe distance from the magazine, and be properly guarded and protected until the repairs have been completed.

### **3.12 DESTROYING EXPLOSIVES**

Explosives which have deteriorated, or have been damaged so that they are unfit for use, shall be destroyed by burning in a safe place, by a qualified person, in accordance with safety provisions set forth by the United States Bureau of Mines and the Institute of Makers of Explosives. EXPLOSIVES SHALL NEVER BE BURIED OR COVERED OVER BY ANY MATERIALS AS A MEANS OF DISPOSAL.

### **3.13 OPENING CONTAINERS OF EXPLOSIVES**

- 3.13.1 No person shall open containers of explosives in or within 50 feet of any magazine.
- 3.13.2 No tools, except wooden wedges, and non-metallic mallets, shall be used for opening containers of explosives, except that metallic slitters may be used for opening fibre board containers, provided such slitters cannot come in contact with metallic case fasteners, or the explosives.

### **3.14 HOUSEKEEPING**

- 3.14.1 All magazines shall be kept free from grit, paper, rubbish and empty containers.
- 3.14.2 All premises surrounding magazines shall be kept free from rubbish, brush, dry grass, trees or other extraneous combustible material for a least 25 feet in all directions. Combustible materials shall not be stored within 50 feet of magazines.

- 3.14.3 No material or tools except material-handling devices necessary to the handling of explosives in storage shall be kept or stored in any magazine containing explosives.

### **3.15 EXISTING MAGAZINES**

Magazines erected prior to the promulgation of this Chapter, which comply with the intent and purpose of this Chapter but are not in accordance with all detailed specifications, may continue in use, at the discretion of the Commissioner. The Commissioner shall have the authority to compel changes necessary to comply with this Chapter, or to reduce the capacity, in accordance with requirements governing construction or quantity—distance tables.

### **3.16 PLANS OF SITE LOCATIONS AND MAGAZINES**

- 3.16.1 No magazine shall be used for the storage of explosives before a permit is secured from the Commissioner in accordance with Chapter 190, Explosives Permits and Fees of Title 12, N.J.A.C.
- 3.16.2 The Commissioner may require a map of the site location showing the nearest buildings, nearest railways, nearest highways, and also showing existing barricades, if any, and barricades that are intended to be used. Plans and specifications of the proposed magazines may also be required.

### **3.17 SIGNS**

- 3.17.1 The premises on which a permanent magazine is located shall be conspicuously marked by signs containing the words "EXPLOSIVES—KEEP OFF" unless such signs tend to attract general public attention to said storage. In such cases, the signs may, upon approval of the Commissioner, be eliminated.
- 3.17.2 No signs shall be placed on surface magazines or barricades, or be so located that a bullet passing directly through the face of the sign will strike the magazine.
- 3.17.3 All Class 3 and Class 4 magazines shall be painted red and marked "EXPLOSIVES" with white paint in letters not less than 3 inches high.
- 3.17.4 "EXPLOSIVES" signs at the site of a permanent magazine shall have the printing in a color contrasting with the background, and in letters not less than 3 inches high.

### **3.18 LIGHTING OF MAGAZINES**

No lights shall be permitted in a magazine except:

- (a) Battery activated lights or battery activated lanterns or
- (b) Electric fixtures with the bulbs adequately guarded against mechanical damage and falling, with all wiring in grounded conduits and with the control switch on the outside of the magazine.

### **3.19 DISCHARGE OF FIREARMS**

No person shall discharge firearms of any kind within 500 feet of a magazine or explosives manufacturing plant, or at or against any such building or magazine, or at or against any sign placard located in such area.

### **3.20 STORAGE WITHIN MAGAZINES**

3.20.1 Detonators shall be stored in a separate magazine and no other explosives except safety fuse may be stored in such a magazine.

3.20.2 Detonating fuse shall be stored in the same magazine with dynamite.

### **3.21 RECORDS**

The records to be kept by a person having a permit to store explosives shall comply with 7.4.4 of Chapter 190, Explosives Permits and Fees of Title 12, N.J.A.C.

## **SECTION 4 — QUANTITY AND DISTANCE REQUIREMENTS FOR STORAGE MAGAZINES**

### **4.1 QUANTITY AND DISTANCE**

4.1.1 Except as otherwise provided, magazines in which any explosives are kept or stored shall be located at distances from buildings, railroads and highways in conformity with Table 4.1.2, unless otherwise authorized by the Commissioner.

4.1.2 Quantity Distance Table 4.1.2—See page 53.

4.1.3 When a magazine is not barricaded the distances shown in the Table 4.1.2 shall be doubled.

## **4.2 MAXIMUM QUANTITY**

No quantity in excess of 300,000 pounds of explosives, or in the case of blasting caps, no number in excess of 20,000,000 caps shall be stored in any magazine.

## **4.3 SEPARATION OF MAGAZINES**

- 4.3.1 When two or more magazines are located on the same property, each magazine shall comply with the minimum distances specified in Table 4.1.2 from inhabited buildings, railways and highways, and in addition they shall be separated from each other by not less than the distances shown for separation of magazines.
- 4.3.2 If any two or more magazines are separated from each other by less than specified separation of magazines distance, then such two or more magazines, as a group, shall be considered as one magazine and the total quantity stored in such group shall be treated as if stored in a single magazine, and shall comply with the minimum distance specified from other magazines, inhabited buildings, railways and highways.
- 4.3.3 The quantity of explosives contained in cap magazines shall govern in regard to the spacing of said cap magazines from magazines containing other explosives, but under no circumstances shall a magazine containing blasting caps be within a less distance than 100 feet unbarricaded or 50 feet barricaded, from any magazine other than magazines containing blasting caps.

Table 4.1.2  
American Table of Distances for Storage of Explosives

| EXPLOSIVES     |                    | DISTANCES IN FEET WHEN STORAGE IS<br>BARRICADED |                       |                    |                            |
|----------------|--------------------|-------------------------------------------------|-----------------------|--------------------|----------------------------|
| Pounds<br>Over | Pounds<br>Not Over | Inhabited<br>Buildings                          | Passenger<br>Railways | Public<br>Highways | Separation<br>of Magazines |
| 2              | 5                  | 70                                              | 30                    | 30                 | 6                          |
| 5              | 10                 | 90                                              | 35                    | 35                 | 8                          |
| 10             | 20                 | 110                                             | 45                    | 45                 | 10                         |
| 20             | 30                 | 125                                             | 50                    | 50                 | 11                         |
| 30             | 40                 | 140                                             | 55                    | 55                 | 12                         |
| 40             | 50                 | 150                                             | 60                    | 60                 | 14                         |
| 50             | 75                 | 170                                             | 70                    | 70                 | 15                         |
| 75             | 100                | 190                                             | 75                    | 75                 | 16                         |
| 100            | 125                | 200                                             | 80                    | 80                 | 18                         |
| 125            | 150                | 215                                             | 85                    | 85                 | 19                         |
| 150            | 200                | 235                                             | 95                    | 95                 | 21                         |
| 200            | 250                | 255                                             | 105                   | 105                | 23                         |
| 250            | 300                | 270                                             | 110                   | 110                | 24                         |
| 300            | 400                | 295                                             | 120                   | 120                | 27                         |
| 400            | 500                | 320                                             | 130                   | 130                | 29                         |
| 500            | 600                | 340                                             | 135                   | 135                | 31                         |
| 600            | 700                | 355                                             | 145                   | 145                | 32                         |
| 700            | 800                | 375                                             | 150                   | 150                | 33                         |
| 800            | 900                | 390                                             | 155                   | 155                | 35                         |
| 900            | 1,000              | 400                                             | 160                   | 160                | 36                         |
| 1,000          | 1,200              | 425                                             | 170                   | 165                | 39                         |
| 1,200          | 1,400              | 450                                             | 180                   | 170                | 41                         |
| 1,400          | 1,600              | 470                                             | 190                   | 175                | 43                         |
| 1,600          | 1,800              | 490                                             | 195                   | 180                | 44                         |
| 1,800          | 2,000              | 505                                             | 205                   | 185                | 45                         |
| 2,000          | 2,500              | 545                                             | 220                   | 190                | 49                         |
| 2,500          | 3,000              | 580                                             | 235                   | 195                | 52                         |
| 3,000          | 4,000              | 635                                             | 255                   | 210                | 58                         |
| 4,000          | 5,000              | 685                                             | 275                   | 225                | 61                         |
| 5,000          | 6,000              | 730                                             | 295                   | 235                | 65                         |
| 6,000          | 7,000              | 770                                             | 310                   | 245                | 68                         |
| 7,000          | 8,000              | 800                                             | 320                   | 250                | 72                         |
| 8,000          | 9,000              | 835                                             | 335                   | 255                | 75                         |
| 9,000          | 10,000             | 865                                             | 345                   | 260                | 78                         |

Table 4.1.2—Continued

| EXPLOSIVES     |                    | DISTANCES IN FEET WHEN STORAGE IS<br>BARRICADED |                       |                    |                            |
|----------------|--------------------|-------------------------------------------------|-----------------------|--------------------|----------------------------|
| Pounds<br>Over | Pounds<br>Not Over | Inhabited<br>Buildings                          | Passenger<br>Railways | Public<br>Highways | Separation<br>of Magazines |
| 10,000         | 12,000             | 875                                             | 370                   | 270                | 82                         |
| 12,000         | 14,000             | 885                                             | 390                   | 275                | 87                         |
| 14,000         | 16,000             | 900                                             | 405                   | 280                | 90                         |
| 16,000         | 18,000             | 940                                             | 420                   | 285                | 94                         |
| 18,000         | 20,000             | 975                                             | 435                   | 290                | 98                         |
| 20,000         | 25,000             | 1,055                                           | 470                   | 315                | 105                        |
| 25,000         | 30,000             | 1,130                                           | 500                   | 340                | 112                        |
| 30,000         | 35,000             | 1,205                                           | 525                   | 360                | 119                        |
| 35,000         | 40,000             | 1,275                                           | 550                   | 380                | 124                        |
| 40,000         | 45,000             | 1,340                                           | 570                   | 400                | 129                        |
| 45,000         | 50,000             | 1,400                                           | 590                   | 420                | 135                        |
| 50,000         | 55,000             | 1,460                                           | 610                   | 440                | 140                        |
| 55,000         | 60,000             | 1,515                                           | 630                   | 455                | 145                        |
| 60,000         | 65,000             | 1,565                                           | 645                   | 470                | 150                        |
| 65,000         | 70,000             | 1,610                                           | 660                   | 485                | 155                        |
| 70,000         | 75,000             | 1,655                                           | 675                   | 500                | 160                        |
| 75,000         | 80,000             | 1,695                                           | 690                   | 510                | 165                        |
| 80,000         | 85,000             | 1,730                                           | 705                   | 520                | 170                        |
| 85,000         | 90,000             | 1,760                                           | 720                   | 530                | 175                        |
| 90,000         | 95,000             | 1,790                                           | 730                   | 540                | 180                        |
| 95,000         | 100,000            | 1,815                                           | 745                   | 545                | 185                        |
| 100,000        | 110,000            | 1,835                                           | 770                   | 550                | 195                        |
| 110,000        | 120,000            | 1,855                                           | 790                   | 555                | 205                        |
| 120,000        | 130,000            | 1,875                                           | 810                   | 560                | 215                        |
| 130,000        | 140,000            | 1,890                                           | 835                   | 565                | 225                        |
| 140,000        | 150,000            | 1,900                                           | 850                   | 570                | 235                        |
| 150,000        | 160,000            | 1,935                                           | 870                   | 580                | 245                        |
| 160,000        | 170,000            | 1,965                                           | 890                   | 590                | 255                        |
| 170,000        | 180,000            | 1,990                                           | 905                   | 600                | 265                        |
| 180,000        | 190,000            | 2,010                                           | 920                   | 605                | 275                        |
| 190,000        | 200,000            | 2,030                                           | 935                   | 610                | 285                        |
| 200,000        | 210,000            | 2,055                                           | 955                   | 620                | 295                        |
| 210,000        | 230,000            | 2,100                                           | 980                   | 635                | 315                        |
| 230,000        | 250,000            | 2,155                                           | 1,010                 | 650                | 335                        |
| 250,000        | 275,000            | 2,215                                           | 1,040                 | 670                | 360                        |
| 275,000        | 300,000            | 2,275                                           | 1,175                 | 690                | 385                        |

#### **4.4 BLASTING CAPS—QUANTITY EQUIVALENT TO WEIGHT**

4.4.1 All blasting caps in strengths through No. 8 caps should be rated as one and one-half pounds of explosives per 1,000 caps.

#### **4.5 CLASS 3 MAGAZINES—QUANTITY**

4.5.1 No Class 3 magazine shall contain a quantity of explosives in excess of 200 pounds.

4.5.2 No Class 3 magazine shall contain a quantity of blasting caps in excess of 1,000 in number.

#### **4.6 CLASS 4 MAGAZINES—LOCATION AND QUANTITY OF EXPLOSIVES**

##### **4.6.1 Location:**

(a) Not more than two Class 4 magazines shall be kept in any one building. One magazine shall be used for the storage of explosives and the other for the storage of blasting caps, squibs or similar items.

(b) Each magazine shall be located on the floor nearest the ground level and within 10 feet from an outside entrance, and separated by a distance of not less than 10 feet.

(c) The location of a Class 4 magazine within a building shall not be changed without approval by the Commissioner.

##### **4.6.2 Quantity:**

(a) No Class 4 magazine shall contain a quantity of explosives in excess of 50 pounds, except that 100 pounds of smokeless powder may be stored when packed in the original containers.

(b) No Class 4 magazine shall contain a quantity of blasting caps, squibs and similar items in excess of 500 in number.

### **SECTION 5 — CLASSIFICATION OF MAGAZINES—SURFACE**

#### **5.1 CLASSIFICATION OF MAGAZINES**

Magazines in which explosives shall be kept or stored shall be one of the following classes:

Class 1—Permanent Storage—intended to apply to dealers and others who store explosives permanently.

Class 2—Temporary Storage—intended to apply to temporary construction work.

Class 3—Daily Supply Storage—to be known as portable daily supply magazines.

Class 4—Storage Within a Building—intended for storage of explosives within a building, other than an inhabited building.

## **SECTION 6 — CONSTRUCTION OF MAGAZINES—GENERAL**

### **6.1 CONSTRUCTION**

Magazines shall be constructed in conformity with this Chapter, or may be of substantially equivalent construction satisfactory to the Commissioner.

### **6.2 OPENINGS**

Magazines shall have no openings except for entrances and ventilation.

## **SECTION 7 — CONSTRUCTION OF MAGAZINES—CLASS 1**

### **7.1 CLASS 1 MAGAZINES**

Class 1 magazines except for underground storage may be a building, earthen dugout, tunnel, igloo or army type magazine and shall be bullet-resistant, fire-resistant, weather-proof, theft-resistant and well ventilated.

### **7.2 BUILDING TYPE MAGAZINES**

7.2.1 **Construction:** All building type magazines shall be constructed of masonry, wood, metal or a combination of these materials.

7.2.2 **Walls—Masonry Construction:** Brick, concrete, tile, cement block and cinder block walls shall be at least 8 inches thick. Hollow masonry units used in construction shall have all hollow spaces filled with well tamped coarse dry sand or weak concrete (a mixture of one part cement and eight parts of sand with enough water to dampen the mixture while tamping in place).

- 7.2.3 **Walls—Fabricated Metal Construction:** Metal wall construction shall consist of sectional sheets of steel or aluminum not less than 14 guage, securely fastened to a metal framework lined inside with brick, solid cement blocks, or hard wood not less than 4 inches in thickness, or shall have at least a six inch sand fill between interior and exterior walls.
- 7.2.4 **Walls—Wood Frame Construction:** The exterior of the outer wood walls shall be covered with iron or aluminum not less than No. 26 guage in thickness. An inner wall of non-sparking material shall be constructed so as to provide a space at least 6 inches between the outer and inner walls, which space shall be filled with coarse dry sand, or a weak mixture of cement mortar.
- 7.2.5 **Floors:** Floors shall be made of wood and shall be strong enough to bear the weight of the maximum quantity to be stored.
- 7.2.6 **Foundations:** Foundations may be constructed of brick, concrete, cement blocks, stone or wood posts, or a solid foundation. If piers or posts are used, the space under the building shall be enclosed with metal to prevent fire from getting under the magazine.
- 7.2.7 **Roof:** Except for fabricated metal magazines the outer roof shall be covered with not less than No. 26 guage iron or aluminum fastened to  $\frac{7}{8}$  inch sheathing.
- 7.2.8 **Bullet Resistant Ceilings:** Roofs of magazines located where it is possible to fire a bullet directly through the roof into the magazine at such an angle that the bullet would strike the explosives therein, shall be constructed by one of the following methods:
- (a) A sand tray located at the line of eaves and covering the entire magazine ceiling area except that necessary for ventilation; line with a layer of building paper and fill with 4 inches of coarse dry sand.
  - (b) A fabricated metal roof with steel plate constructed of  $\frac{3}{16}$  inch plate steel lined with 4 inches of hard wood; for each additional  $\frac{1}{16}$  inch of plate steel, the hard-wood lining may be decreased 1 inch.
  - (c) Other structural means of bullet resistance approved by the Commissioner.

**7.2.9 Doors:** All Class 1 magazines shall be equipped with a door constructed in the following manner:

- (a) The door shall be constructed of  $\frac{3}{8}$  inch plate steel and lined with  $2\frac{5}{8}$  inches hardwood applied in  $\frac{3}{8}$  inch layers. If the thickness of steel is less than  $\frac{3}{8}$  inch then the door shall be lined with 4 inches of hardwood.
- (b) Hinges and hasps are to be attached to the doors by welding, or rivets or bolts with nuts on inside of door, and installed in such a manner that the fastening cannot be removed when the magazine door is closed and locked.

**7.2.10 Locks:** The door 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 3 point lock. Locks shall be five tumbler proof.

**7.2.11 Lock Protection:** All padlocks on the door shall be protected with  $\frac{1}{4}$  inch steel cups so constructed as to positively prevent lever action on the lock or hasp.

**7.2.12 Ventilation:**

- (a) A 2-inch air space shall be left around the ceiling and around the perimeter of the floor, except at the doorway.
- (b) Foundation ventilators shall not exceed 6 feet center to center and the openings shall not be less than 4 inch x 6 inch.
- (c) Vents in the foundation, roof or gables, shall be screened, and where necessary offset, to prevent the entrance of sparks through foundation vents.

**7.2.13 Exposed Metal:**

- (a) All nails in the interior of magazines shall be blind nailed or countersunk.
- (b) No sparking metal construction shall be exposed below the top of walls inside the magazine.

### **7.3 IGLOO OR ARMY TYPE MAGAZINES**

- 7.3.1 **Construction:** All igloo or Army type magazines shall be constructed of reinforced concrete, masonry, metal or a combination of these materials.
- 7.3.2 **Earth Mound Covering:** All igloo or Army type magazines shall have an earth mound covering of not less than 24 inches on the top, sides and rear.

## **SECTION 8 — CONSTRUCTION OF MAGAZINES—CLASS 2**

### **8.1 CLASS 2 MAGAZINES**

Class 2 magazines may be the equivalent of the construction for Class 1 magazines or conform to the requirements of this Section 8.

### **8.2 BUILDING AND BOX TYPE MAGAZINES**

- 8.2.1 Metal wall construction shall consist of sectional sheets of steel or aluminum not less than 14 gauge securely welded or fastened to a metal framework lined with 3 inches of soft wood or 2 inches of hard wood.
- 8.2.2 Floors shall conform to 7.2.5.
- 8.2.3 Roof shall conform to 7.2.7.
- 8.2.4 Bullet resistant ceiling shall conform to 7.2.7.
- 8.2.5 Doors shall conform to 7.2.9.
- 8.2.6 Locks and lock protection shall conform to 7.2.10 and 7.2.11.
- 8.2.7 Vents shall be provided in the sides or roof and be adequately screened, and where necessary offset, to prevent the entrance of sparks through the vents.
- 8.2.8 Covering of exposed metal shall comply with 7.2.13.

## **SECTION 9 — CONSTRUCTION OF MAGAZINES— CLASSES 3 and 4**

### **9.1 MATERIAL**

Class 3 and 4 magazines shall be of wood or metal, or a combination thereof.

## **9.2 WOOD MAGAZINES**

Wood magazines of this class shall have sides, bottom and cover constructed of 2 inch hardwood or 3 inch softwood braced at the corners and covered on the outside with not less than No. 26 gauge sheet metal.

## **9.3 METAL MAGAZINES**

Metal magazines of this class shall have the sides, bottom and cover constructed of steel plate not less than 16 guage and shall be lined with  $\frac{7}{8}$  inch plywood or the equivalent.

## **9.4 EXPOSED METAL**

All nails and other sparking material exposed to interior of the magazine shall be well countersunk.

## **9.5 COVERS**

Covers for both wood and metal magazines shall be provided with substantial strap hinges.

## **9.6 LOCKS**

Covers shall be equipped with a 5 tumbler jarproof lock or the equivalent.

## **9.7 CASTERS OR WHEELS**

All Class 4 magazines shall be mounted on casters or wheels.

## **9.8 SIGNS**

The word "EXPLOSIVES" in letters at least 3 inches in height shall be painted on the magazine. The magazine shall be painted red and the lettering shall be white.

## **9.9 VENTILATION**

All magazines shall be provided with adequate ventilation.

## SECTION 10 — MINES AND TUNNELS

### 10.1 UNDERGROUND STORAGE—GENERAL

#### 10.1.1 Tunnels:

- (a) No explosives shall be stored in any tunnel where persons are employed.
- (b) All unused explosives shall be returned to the primary storage magazine immediately after the completion of loading operations.

#### 10.1.2 Mines:

- (a) No explosives shall be stored underground until the mine has been developed to the point where at least two modes of egress have been provided.
- (b) All daily supplies of explosives within the mine at any working place shall be kept in boxes with hinged lids.
- (c) It is strictly forbidden to leave any explosives in or near any working place; if required for the following shift, the storage shall comply with 10.1.2(b).
- (d) In the event of the closing of any mine or a part thereof, the explosives stored in that particular area shall immediately be removed.

### 10.2 UNDERGROUND STORAGE—MAGAZINE LOCATIONS

- 10.2.1 Primary storage auxiliary or secondary and daily supply magazines shall be so located that the accidental detonation of their contents will not cut off the escape of the employees.
- 10.2.2 Primary storage magazines shall be at least 300 feet from any shaft, slope or active mine working and at least 25 feet from haulage ways or travelways, and trolley wires.
- 10.2.3 Magazines containing blasting caps shall not be located closer than 50 feet from any magazine containing other explosives.
- 10.2.4 There shall be two or more right angle turns between the primary or auxiliary storage magazines and the nearest escape-way or travelway.

### **10.3 UNDERGROUND STORAGE—QUANTITY**

#### **10.3.1 Auxiliary or Secondary Magazines:**

- (a) Not more than 5,000 pounds of explosives or more than 10,000 detonators shall be stored in auxiliary or secondary magazines.

#### **10.3.2 Daily Supply Magazines:**

- (a) Not more than a one day's supply of explosives or detonators shall be stored in daily supply magazines.

### **10.4 UNDERGROUND STORAGE—CLASS 1 MAGAZINE CONSTRUCTION**

10.4.1 All primary and auxiliary or secondary magazines shall be constructed in solid rock.

10.4.2 The floors of all magazines shall be so constructed that water will drain away from the magazines.

10.4.3 All floors shall be wood lined or covered with wooden slats.

10.4.4 All primary and auxiliary or secondary magazines shall be conspicuously marked with the words MAGAZINE—EXPLOSIVES—DANGEROUS.

10.4.5 All primary and secondary magazines shall be equipped with a door and at least one lock.

10.4.6 Doors for primary and secondary magazines shall be a minimum of 26 gauge sheet metal or other material of equivalent fire resistive protection and lined with 2 inches of hardwood.

10.4.7 No lights shall be permitted in a primary or secondary magazine, except:

- (a) Battery activated lights or battery activated lanterns or
- (b) Electric fixtures with the bulbs adequately guarded against mechanical damage and falling, with all wiring in grounded conduits and with the control switch on the outside of the magazine.

10.4.8 Where added ventilation is required, it is to be provided by a tube blower fan located in the ventilating current with the tube extended into the magazine.

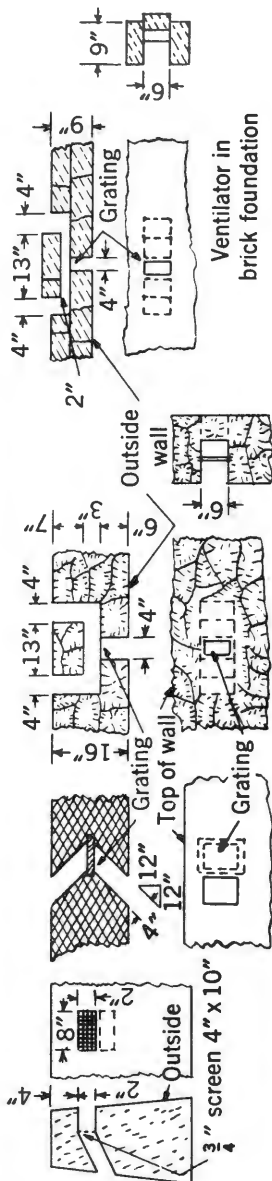
## 10.5 UNDERGROUND STORAGE—CLASS 3 MAGAZINE CONSTRUCTION

- 10.5.1 Daily supply magazines shall be constructed of hardwood having a thickness of 2 inches, be painted red, and the word "EXPLOSIVES" painted in white letters 3 inches in height.

### APPENDIX A

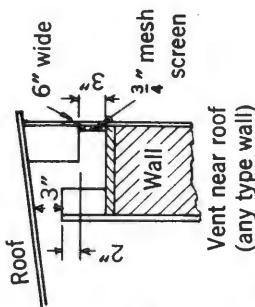
Drawings of explosives storage magazines have been reproduced from the Bureau of Mines Information Circular No. 7674, Bureau of Mines Miners Circular No. 54 and Pamphlet No. 1 Standard Storage Magazines published by the Institute of Makers of Explosives.

Details of construction of the magazines shown are general, and may be altered to suit the individual according to his needs, provided that the minimum requirements of this Chapter are met.

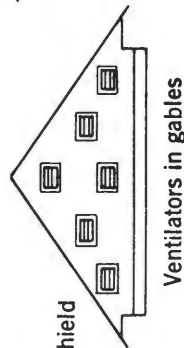


Ventilator in stone foundation

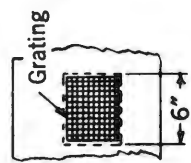
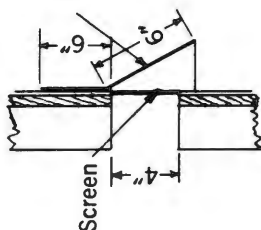
Ventilators in concrete foundations



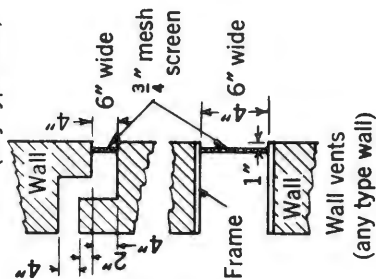
Vent near roof  
(any type wall)



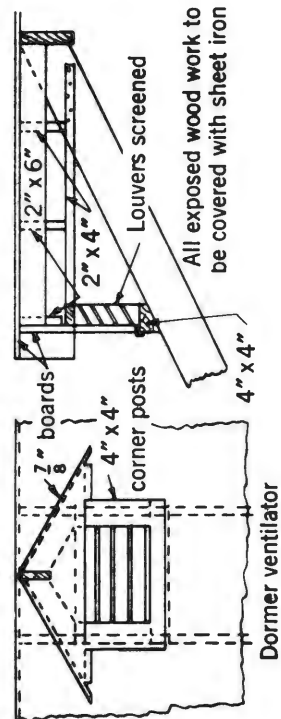
Ventilators in gables



Ventilator in  
post foundations

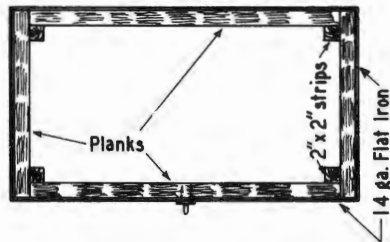


Wall vents  
(any type wall)



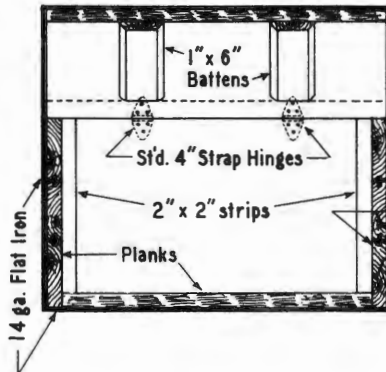
Dormer ventilator

VENTILATION FOR CLASS 1 OR 2 MAGAZINES.

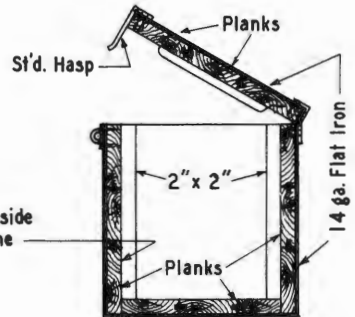


PLAN

All Planks to be 2" hardwood or 3" softwood.



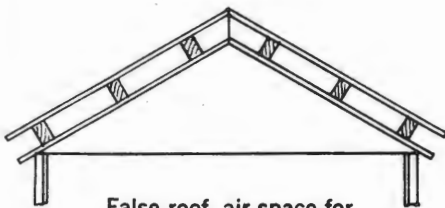
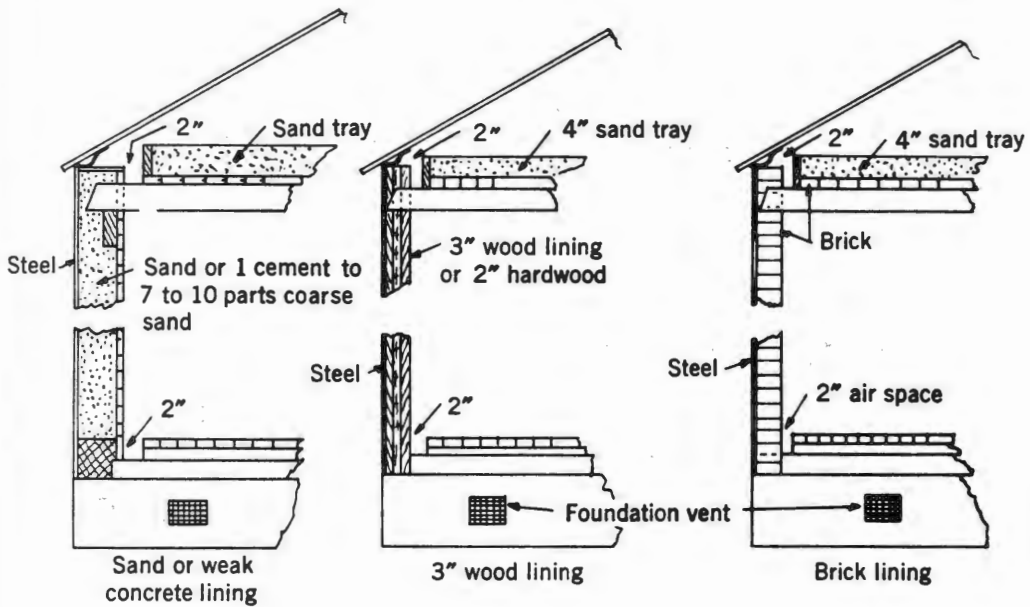
SECTIONAL FRONT ELEVATION



SECTIONAL SIDE ELEVATION

### CLASS 3 PORTABLE (DAILY SUPPLY) MAGAZINE.

Construction: Box to be built of 2 inch hardwood or 3 inch softwood well braced at the corners; lumber to be smooth on the inside of the box; no metal to be exposed on inside; lid or door to be securely locked with at least one lock equivalent to a 5 - tumbler jar proof lock; box to be metal covered as indicated in drawing above; size of magazine to suit number and shape of packages to be stored; magazine to be painted red with word "EXPLOSIVES" in white letters not less than 3 inches high on top, sides, and ends of magazine.

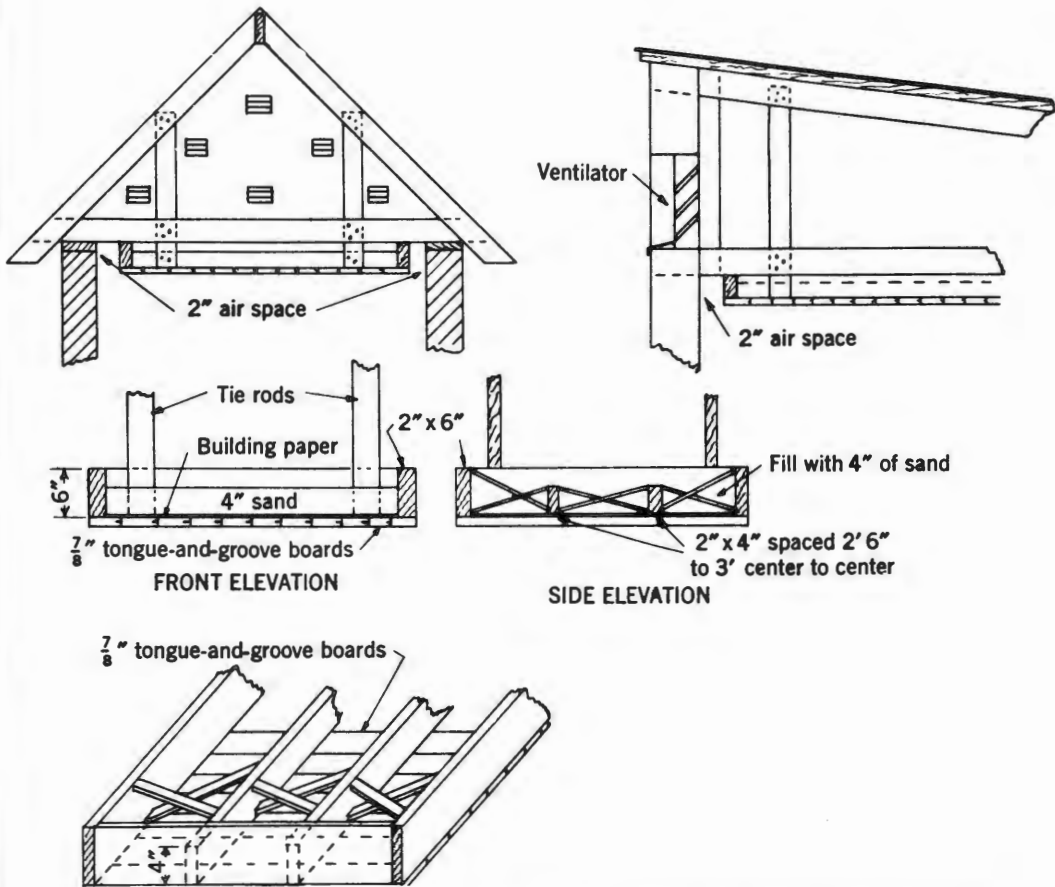


False roof, air space for maintaining lower temperature

#### LININGS FOR CLASS 1 OR 2 STEEL MAGAZINES.

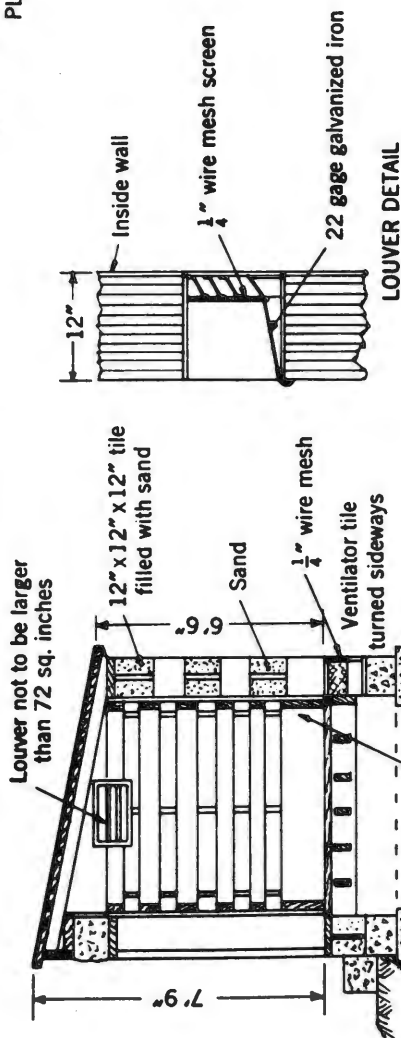
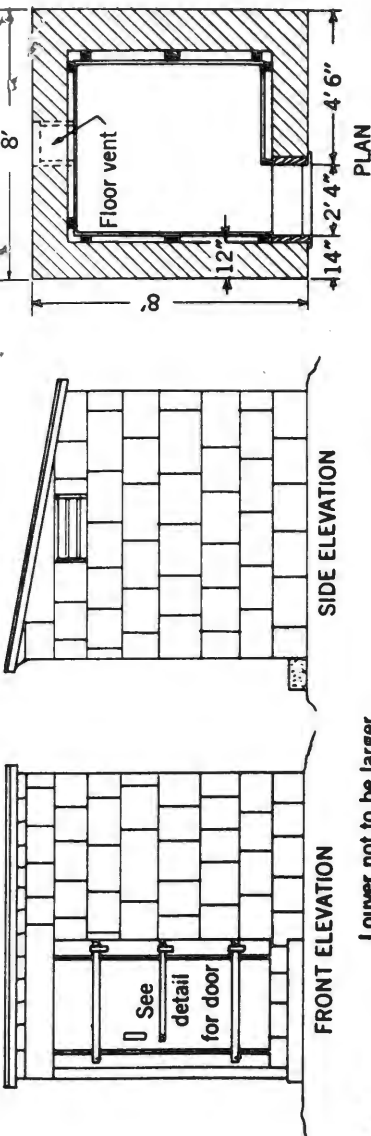
Specifications: Metal should not come in contact with stored explosives; floors to be blind-nailed and lining nails to be countersunk; and false roof or 7/8-inch ceiling to be used when necessary to maintain temperature in magazine.





#### METHOD OF CONSTRUCTING A CLASS 1 OR 2 MAGAZINE SAND-TRAY CEILING.

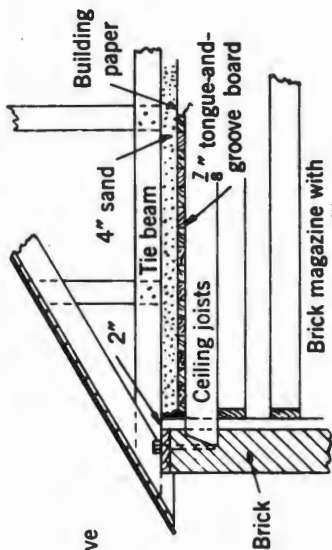
Construction: Side and end of box to be built of 2- by 4-inch boards and installed as needed, depending on size of box; bottom of box to be  $\frac{7}{8}$ -inch tongue-and-groove boards covered with building paper; box to be filled to the top of the 2 by 4's with dry, coarse sand; brace roof as needed to carry weight of sand tray; and tie rods may be of steel or wood, the number used depending on size of box.



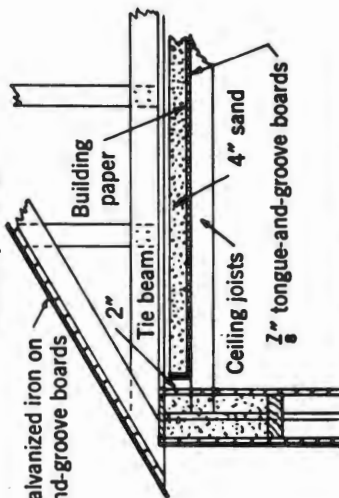
Opening to be no larger than 72 sq. in.

#### PLAN AND SECTIONS OF CLASS 1 OR 2 MAGAZINES - TYPE II.

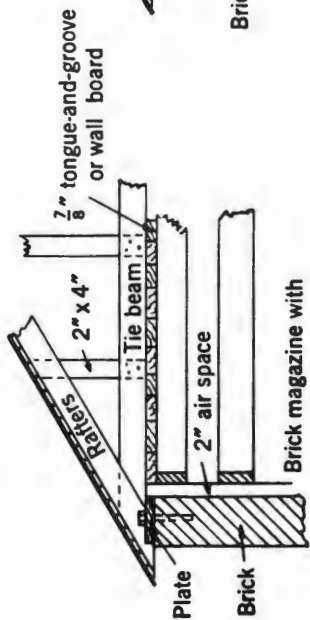
**Construction:** 12- by 12- by 12-inch hollow tile with cells filled with screened sand, but may be constructed of other material such as soft brick, weak concrete or masonry, cement, or concrete blocks with cells filled with screened sand, cement mortar, or other bullet-resistant filler; walls to be not less than 6 inches thick; and louvers or ventilators to be not larger than 72 square inches. Size and type of vents will depend on kind of material used. Foundation will vary with thickness of wall (sketch is for 12-inch walls).



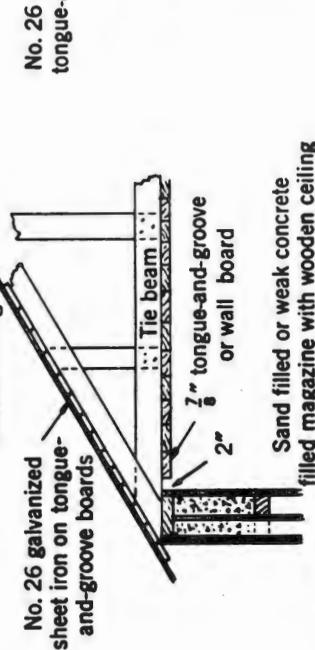
Brick magazine with sand-tray ceiling



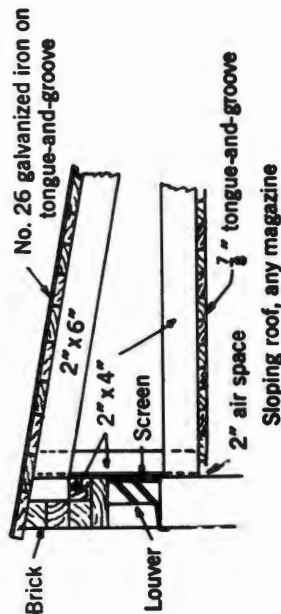
Sand-filled or weak concrete-filled magazine with sand-tray ceiling



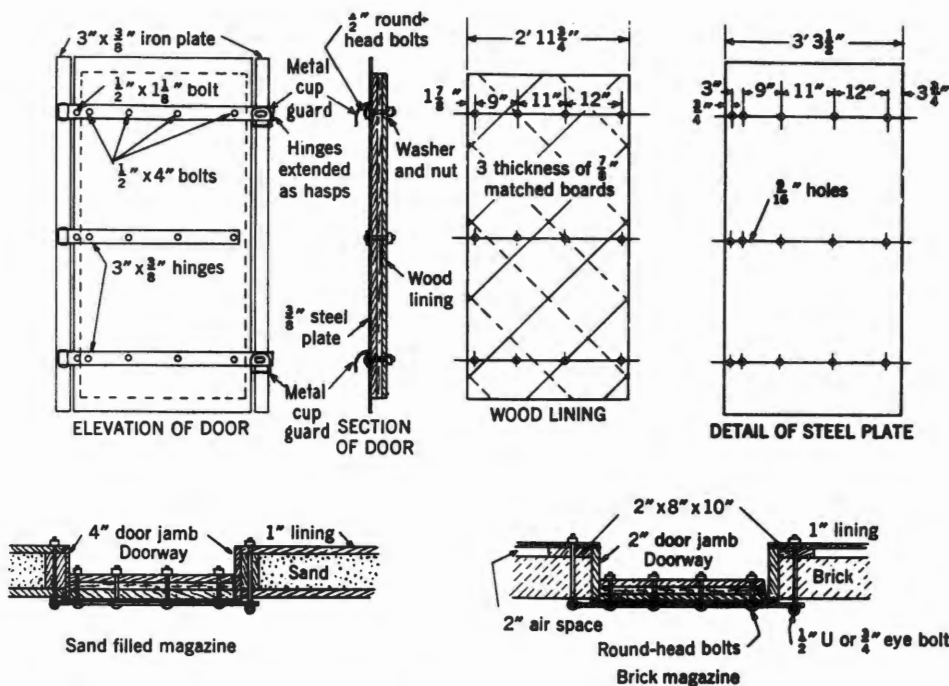
Brick magazine with wooden ceiling



Sand filled or weak concrete filled magazine with wooden ceiling



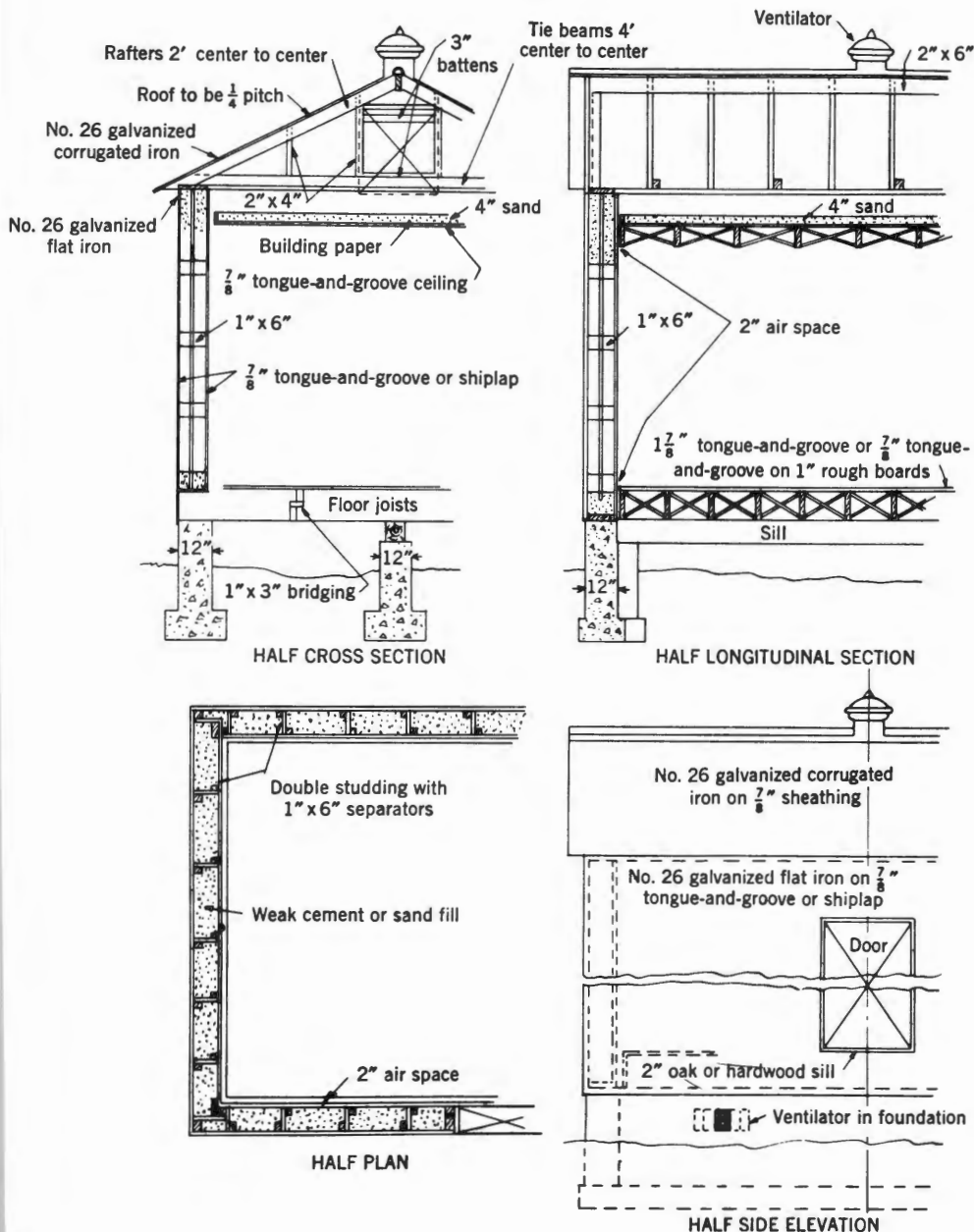
Sloping roof, any magazine



SECTIONAL VIEWS OF DOOR

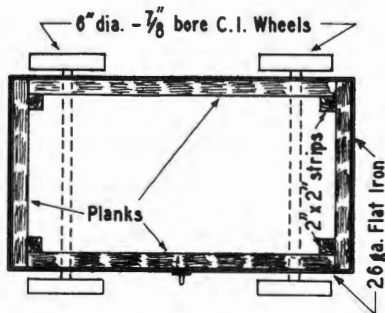
# SKETCH OF EASILY CONSTRUCTED CLASS 1 AND 2 MAGAZINE DOORS.

Construction: Three thicknesses of  $\frac{7}{8}$  inch tongue and groove boards are laid diagonally back of a  $\frac{3}{8}$  inch steel plate; doors should be  $\frac{3}{8}$  inch steel plate and lined with at least  $2\frac{5}{8}$  inches of hardwood applied in  $\frac{3}{8}$  inch layers. If the thickness of steel is less than  $\frac{3}{8}$  inch the door shall be lined with 4 inches of hardwood; hinges and staples to be attached by welds, rivets, or bolts fitted with lock washers and nuts on the inside; door to be equipped with two padlocks fastened in separate staples; top and bottom hinge straps to be extended to cover iron plate for hasp and either U or I bolt for staple, or two hasps and staples substituted, hasp ends of bar hinge to be covered by a  $\frac{1}{4}$  inch thick metal cup guard open at bottom to allow access with key, guard to be welded to bar hinge.



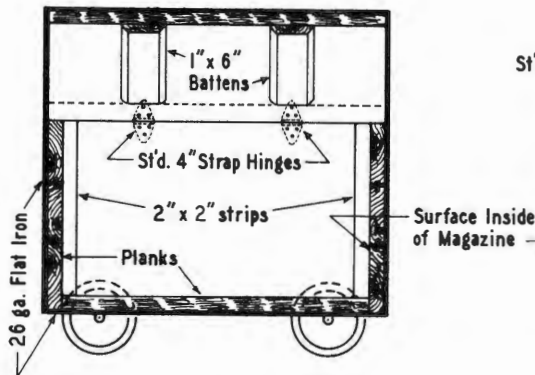
# STANDARD SAND-FILLED OR WEAK CONCRETE-FILLED CLASS 1 OR 2 MAGAZINES - TYPE III.

Specifications: Outside and inside sheathing to be tongue-and-groove boards to prevent loss of sand; space between outside and inside sheathing to be filled with weak concrete mortar, approximately 1 part Portland cement and 7 to 10 parts sand or 6 to 12 inches of weak mortar over the sills and coarse, dry sand in the remaining space; bullet-proof sand roof as shown; floor and ceiling to stop 2 inches from walls to provide ventilation; and nails in walls and floors to be concealed.

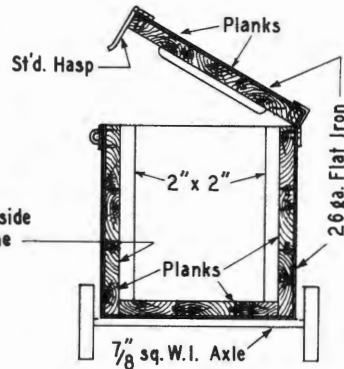


PLAN

All Planks to be 2" hardwood or 3" softwood.



SECTIONAL FRONT ELEVATION



SECTIONAL SIDE ELEVATION

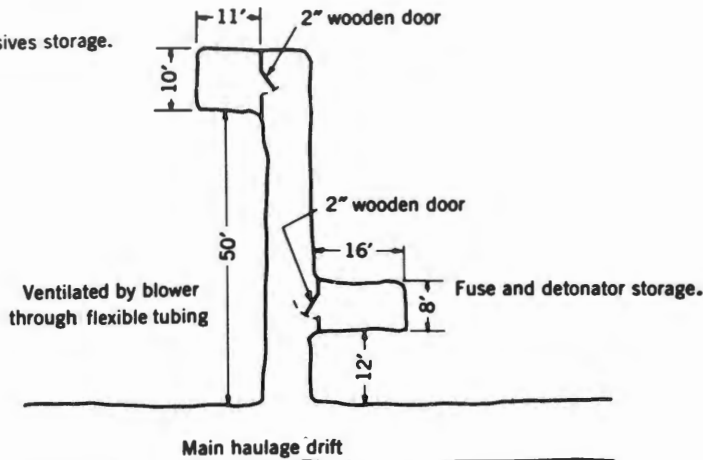
#### CLASS 4 PORTABLE MAGAZINE WITH WHEELS.

Construction: Box to be built of 2 inch hardwood or 3 inch softwood well braced at the corners; lumber to be smooth on the inside of the box; no metal to be exposed on inside; lid or door to be securely locked with at least one lock equivalent to a 5 - tumbler jar proof lock; box to be metal covered as indicated in drawing above; size of magazine to suit number and shape of packages to be stored; magazine to be painted red with word "EXPLOSIVES" in white letters not less than 3 inches high on top, sides, and ends of magazine.

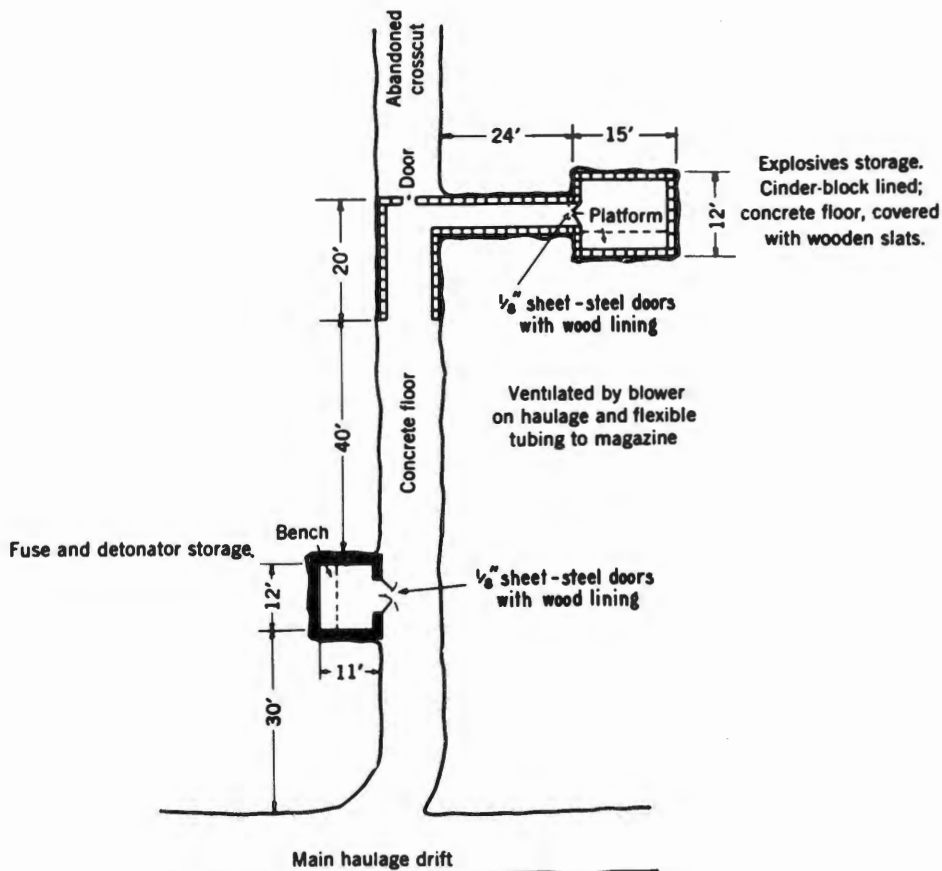


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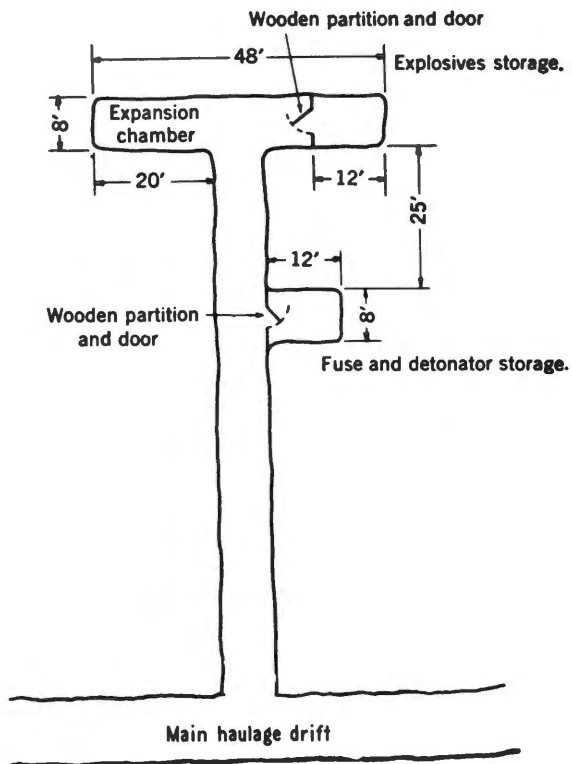
Explosives storage.



EXPLOSIVES MAGAZINE - TYPE A .



EXPLOSIVES MAGAZINE - TYPE B.



EXPLOSIVES MAGAZINE - TYPE C.

# **N. J. A. C. 12:193**

(SAFETY REGULATION No. 23)

*Governing*

## **THE USE OF EXPLOSIVES**

*Effective August 20, 1965*

STATE OF NEW JERSEY  
DEPARTMENT OF LABOR & INDUSTRY  
BUREAU OF ENGINEERING & SAFETY  
TRENTON, NEW JERSEY

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## SECTION 1 — PURPOSE AND SCOPE

### 1.1 PURPOSE

This Regulation is promulgated to establish reasonable minimum requirements and standards for the use of explosives in the interest of the life, health and safety of employees, and the public, as well as the protection of property.

### 1.2 SCOPE

This Chapter is applicable to every person who uses explosives in this State.

### 1.3 EXCEPTIONS

In cases of practical difficulty or unnecessary hardship, the Commissioner may grant exceptions from this Chapter providing that a request for such exception has been made in writing. Exceptions can only be granted when it is clearly evident that a satisfactory and safe condition is attained, but cannot be granted in any case where conflict would be created with mandatory requirements of the law.

## SECTION 2 — DEFINITIONS

|                  |                                                                                                                                                                                                                                                        |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ACCELEROGRAPH    | An instrument of the Crandall type, or equivalent, for recording acceleration of ground.                                                                                                                                                               |
| AIR LOADER       | Pneumatic or air-pressure equipment for injecting explosives into a drill hole or other cavity.                                                                                                                                                        |
| AMMONIUM NITRATE | A chemical compound represented by the formula $\text{NH}_4\text{NO}_3$ .                                                                                                                                                                              |
| APPROVED         | Approved by the Commissioner.                                                                                                                                                                                                                          |
| BLAST AREA       | That area considered hazardous by the blaster, taking into consideration the material to be blasted, the type of blast, the location of the blast, the number, depth and spacing of holes to be blasted, and the quantity and type of explosives used. |

|                                                 |                                                                                                                                                                                                                     |
|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BLASTER                                         | The person in possession of a valid state permit of appropriate grade to use explosives for blasting purposes.                                                                                                      |
| BLASTING CAP                                    | A shell closed at one end, and containing a detonating charge which is ignited by flame or spark from safety fuse.                                                                                                  |
| BLOCK HOLING                                    | The breaking of boulders by firing a small charge of explosives that has been loaded in a small diameter drill hole.                                                                                                |
| COMMISSIONER                                    | The Commissioner of Labor and Industry, or his authorized representative.                                                                                                                                           |
| CONSTRUCTION TYPE<br>OF EXCAVATIONS<br>OPEN PIT | The pit type of removal operation in which the final subgrade is 10 feet or more below the level of the surrounding area.                                                                                           |
| SIDE HILL                                       | The type of rock cut with a wall on one side in which the subgrade is 10 feet or more below the level of the surrounding area.                                                                                      |
| THROUGH CUT                                     | The type of material removing operation with a wall on both sides in which the subgrade is 10 feet or more below the level of the surrounding area.                                                                 |
| TRENCHING                                       | Material removal when the depth is less than 10 feet from the surrounding area to subgrade and including, but not limited to, pipe lines, foundations, pole lines and similar types of construction and demolition. |
| TUNNELS AND SHAFTS                              | The type of construction operation in its normal connotation.                                                                                                                                                       |
| DELAY ELECTRIC<br>BLASTING CAP                  | An electric blasting cap with a delay timing element interposed between the ignition element and the detonating charge.                                                                                             |
| DELAY FIRING                                    | The detonation of charges of explosives in predetermined sequence, which may be accomplished by using regular or short period delay electric blasting caps or some means of equivalent in effectiveness.            |

## DEPARTMENT

The Department of Labor and Industry.

## DETONATING FUSE

A fuse containing a core of high explosives of sufficient strength to detonate other cap sensitive or detonating fuse sensitive explosives lying alongside and to explode the entire charge.

## DETONATOR

Any device used for the purpose of initiating an explosive charge and shall include, but is not limited to, blasting caps, electric blasting caps, or delay electric blasting caps.

## ELECTRIC BLASTING CAP

A shell containing a charge of detonating compound designed to be ignited by an electric current passed through the two insulated leg wires that project through the seal of the shell.

## ENERGY RATIO

Mathematical relation between either (1) the ground displacement and frequency of vibration or (2) acceleration of ground and frequency of vibration.

## EXPLOSIVE POWDER ACTUATED TOOL

A machine which propels or discharges an object by application of energy created by the detonation of an explosive for the purpose of impinging upon, affixing to or penetrating another object or material. This term shall not include jet tappers or perforators.

## FUSE LIGHTERS AND FUSE IGNITERS

Special devices for the purpose of igniting safety fuse.

## LEADING WIRES

The wires extending from the end of the permanent blasting wires to the leg wires.

## LOADING LINE

The pipe or hose through which powder is introduced into the drill hole or other cavity.

## MISSED HOLE

A drill hole containing an explosive charge which failed to explode.

## MUD CAPPING—(BULL- DOZING, ADOBE BLASTING, DOBYING)

The blasting of boulders by placing a quantity of explosives with a detonator on or against a rock, boulder or other object without confining the explosives in a drill hole.

|                          |                                                                                                                                                                                                  |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NITRO-CARBO-NITRATE      | A mixture intended for blasting consisting substantially of inorganic nitrates and carbonaceous combustibles in which none of the ingredients is a commercial explosive.                         |
| PERMANENT BLASTING WIRES | Those wires between the blasting switch and the power switch including sections between safety switches for use in blasting where the power source is an electric circuit.                       |
| PERMISSIBLE EXPLOSIVES   | Those which have been tested and approved by the U. S. Bureau of Mines for blasting in explosive gaseous and explosive dust hazard atmospheres, provided they are used in the prescribed manner. |
| PRIMARY BLASTING         | The blasting operation by which the original rock formation is dislodged from its natural location, including toe and seam shooting.                                                             |
| PRIMER                   | An explosive cartridge with a detonator or igniting agent inserted therein.                                                                                                                      |
| SAFETY FUSE              | An internal burning medium through which fire is conveyed at a continuous and uniform rate for the purpose of firing explosives.                                                                 |
| SEAM SHOOTING            | Removing loosened or overhanging material from the rock face by the use of explosives.                                                                                                           |
| SECONDARY BLASTING       | The reduction of oversize material by the use of explosives to the dimension required for handling, and shall include mud-capping and block-holing.                                              |
| SEISMOGRAPH              | An instrument of the Leet portable displacement seismograph type, or equivalent, for recording ground displacement and frequency, or particle velocity.                                          |
| SMALL ARMS AMMUNITION    | Any cartridge or shell for use in a pistol, rifle or shotgun, and shall include ball, shot or blank cartridges or shells.                                                                        |
| SPRINGING                | The creation of a pocket in the bottom of a drill hole by the use of a moderate quantity of explosives in order that larger quantities of explosives may be inserted therein.                    |

## **SQUIBS—ELECTRIC**

Similar in appearance to a blasting cap, which upon firing by an electric current provides an intense flame instead of a detonation.

## **STEMMING**

A suitable inert incombustible, free-flowing material used to confine or separate explosives in a drill hole, or to cover explosives in mud-capping.

## **TOE SHOOTING**

The removing, through the use of moderate quantities of explosives loaded into small diameter holes of ledge or high bottom that remains after a main primary shot.

# **SECTION 3 — GENERAL PROVISIONS**

## **3.1 COMPLIANCE**

3.1.1 All persons using explosives shall comply with this Chapter.

3.1.2 It is prohibited for any person to:

- (a) Use explosives unless in possession of a valid permit, or the explosives are being used under the direct supervision of a person in possession of a valid permit to use explosives.
- (b) Use explosives except in compliance with the limitations expressed on the permit.

## **3.2 EXCLUDED EXPLOSIVES**

Excluded explosives, as listed in 8.1 of Chapter 190, Explosives Permits and Fees of Title 12, N.J.A.C. shall not be used.

## **3.3 EXEMPTIONS**

3.3.1 This Chapter shall not be construed as applying to the following when used for the purpose for which they are intended:

- (a) Small arms ammunition.
- (b) Explosive power-packs in the form of explosive cartridges.
- (c) Explosive-charged construction devices such as:
  - (1) Explosive rivets.
  - (2) Explosive bolts.
  - (3) Explosive charges for driving pins or studs.
  - (4) Cartridges for explosive-actuated power tools.

3.3.2 Persons holding, or employed by a person holding, a permit to manufacture explosives, and who are engaged in the testing of explosives incident to the manufacture or development thereof, shall not be required to obtain a permit to use explosives.

3.3.3 Persons employed by a person holding a permit to use explosives in processing, and who are engaged in the testing of explosives incident to the processing of explosives shall not be required to obtain a permit to use explosives.

3.3.4 Persons who are engaged in:

(a) The hand loading of small arms ammunition which is not for resale, or

(b) Hold a permit to engage in model or amateur rocketing.

### **3.4 ACCIDENTS, FIRES, EXPLOSIONS, THEFT OR PROPERTY DAMAGE**

All accidents, fires, accidental explosions, theft or property damage occurring in connection with the use of explosives shall be reported at once to the Bureau of Engineering and Safety by telephone, and be supplemented by a detailed written report.

### **3.5 PERMITS**

3.5.1 Requirements concerning permits are set forth in Chapter 190, Explosives Permits and Fees of Title 12, N.J.A.C.

3.5.2 The permit to use explosives shall be in the possession of the permittee at all times when he is using explosives.

3.5.3 Permits shall at all times be readily available to inspection by the Commissioner, State Police or local police and fire departments, and shall be posted as directed by the Commissioner.

### **3.6 RESPONSIBILITY FOR COMPLIANCE**

3.6.1 Every contractor, mine and quarry operator and other persons employing the services of a licensed blaster shall use every reasonable precaution to provide for the safety of all employees on the job and of such other persons who may be legally entitled to be on such job, as well as the safety of the public, and it shall be the duty of such contractor, mine and quarry

operator and other employer to comply with the requirements of this Chapter.

- 3.6.2 Every contractor, mine and quarry operator and other persons employing the services of a licensed blaster shall be held jointly responsible with the blaster for compliance with the requirements of this Chapter.
- 3.6.3 Where work involves the use of explosives for blasting purposes, both a contractor and a sub-contractor shall comply with the requirements of this Chapter.
- 3.6.4 The employer shall be made responsible for making the contents of this Chapter known to his employees.
- 3.6.5 Every employee shall observe all the requirements of this Chapter which directly concerns or affects his conduct.
- 3.6.6 The blaster shall not use and detonate explosives unless the requirements of this Chapter have been observed, and every reasonable precaution, not specifically set forth in this Chapter, is taken to prevent accidents or damage to property.

### **3.7 SMOKING AND OPEN LIGHTS**

Smoking, open lights, or fire of any kind is prohibited within 100 feet where explosives are being handled, used, or temporarily placed. No source of ignition, except means necessary to light fuses or fire electric detonators is permitted in an area containing loaded holes.

### **3.8 INTOXICATING LIQUORS**

- 3.8.1 No person while under the influence of intoxicating liquors, beverages or drugs shall handle or use explosives or be in the vicinity of loading operations.
- 3.8.2 No intoxicating liquors, beverages or drugs shall be permitted in the area where explosives are being handled, used or temporarily placed.

### **3.9 OPERATIONS DURING ELECTRICAL STORMS**

- 3.9.1 All use of explosives, and any handling thereof, shall be stopped immediately upon the approach of a thunderstorm, and all persons in the area shall immediately seek a place of safety.

- 3.9.2 Persons working underground or in shafts or tunnels where explosives are being handled shall be warned of the storm's approach, and shall be required to seek a place of safety until informed that the storm has passed.
- 3.9.3 Explosives at the top of any shaft leading to where men are working shall be moved away from such location a distance equal to that required for inhabited buildings in the Quantity and Distance Table 4.1.2 of Chapter 192 of Title 12, N.J.A.C. upon the approach of an electrical storm, unless a greater hazard would be created thereby.

### **3.10 PROXIMITY TO UTILITIES—OTHER THAN GAS TRANSMISSION PIPE LINES**

- 3.10.1 It shall be the responsibility of the blaster or his employer to make every reasonable effort to ascertain the location of utilities prior to conducting blasting operations.
- 3.10.2 Whenever blasting is being conducted within 50 feet of electric, water, fire alarm, telephone, telegraph and steam or other utilities, and liquid material transmission lines and within 200 feet of railroads, the blaster or his employer 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.
- 3.10.3 In the event of an emergency involving immediate and substantial danger to life, health or property, the 24-hour prior notice will be waived if notice, in writing, or otherwise, is given at any time before blasting is undertaken.
- 3.10.4 Service of a single notice of intention shall constitute compliance with this section when blasting takes place on more than one day, provided it is a part of a single continuing project.
- 3.10.5 In the event that damage does occur to any water, fire alarm, telephone, telegraph or steam utility, or railroad the appropriate representative of such utility or railroad shall be notified.
- 3.10.6 The maximum quantity of explosives per delay which can be detonated within 50 feet of any utility described in 3.10.1 shall conform to the quantity-distance Table 10.4.3 of this Chapter.

### **3.11 PROXIMITY TO UTILITIES—GAS TRANSMISSION PIPE LINES (P. L. 1964, Chapter 53)**

- 3.11.1 Whenever blasting is being conducted within 200 feet of any pipe distributing manufactured, mixed or natural gas, the blaster or his employer shall serve a written notice of intention at least 3 full working days (excluding Saturdays, Sundays, or holidays) prior to the discharge of the explosives on the person engaged in the distribution or transmission of manufactured, mixed or natural gas within the area.
- 3.11.2 The written notice of intention shall be served personally, or by registered mail or by certified mail, return receipt requested, on the person so engaged in the transmission or distribution of the aforesaid gases and shall contain the name of the person responsible, the date, place and type of discharge to be conducted.
- 3.11.3 Service of a single notice of intention shall constitute compliance with this section when the discharge of explosives takes place on more than one day provided it is a part of a single continuing project.
- 3.11.4 Within three days after receipt of the notice of intention, the person engaged in the distribution or transmission of the aforesaid gases shall advise in writing or otherwise the person named in the said notice of intention.
- 3.11.5 In the event of an emergency involving an immediate and substantial danger of death or serious personal injury, it shall be lawful to discharge explosives in the ground if such notice and advice, in writing or otherwise, are given at any time before any such discharge is undertaken.
- 3.11.6 In the event that damage does occur, the person distributing or transmitting manufactured, mixed or natural gas in the area shall be notified immediately.

### **3.12 DETERIORATED EXPLOSIVES**

- 3.12.1 No deteriorated explosives or explosives which have been damaged so they are unfit for use shall be used for blasting operations. Explosives which are deviated from normal color or condition (texture, size, etc.) shall be considered deteriorated until their exact condition is determined by expert opinion.

3.12.2 Explosives which have deteriorated, or have been damaged so that they are unfit for use, shall be destroyed by burning in a safe place, by a qualified person, in accordance with the safety provisions set forth by the United States Bureau of Mines and the Institute of Makers of Explosives. EXPLOSIVES SHALL NEVER BE BURIED OR COVERED BY ANY MATERIALS AS A MEANS OF DISPOSAL.

### 3.13 RADIO FREQUENCY TRANSMITTERS

3.13.1 Mobile radio transmitters which are less than 100 feet away from electric blasting caps in other than original containers shall be de-energized and be effectively locked.

3.13.2 All electric blasting operations shall be conducted at no less distance from any fixed or mobile AM transmitters than indicated in Table 3.13.2.

Table 3.13.2  
Fixed or Mobile AM Transmitters

| TRANSMITTER POWER<br>Watts | MINIMUM DISTANCE<br>Feet |
|----------------------------|--------------------------|
| 5 - 25                     | 100                      |
| 25 - 50                    | 150                      |
| 50 - 100                   | 220                      |
| 100 - 250                  | 350                      |
| 250 - 500                  | 450                      |
| 500 - 1,000                | 650                      |
| 1,000 - 2,500              | 1,000                    |
| 2,500 - 5,000              | 1,500                    |
| 5,000 - 10,000             | 2,200                    |
| 10,000 - 25,000            | 3,500                    |
| 25,000 - 50,000            | 5,000                    |
| 50,000 - 100,000           | 7,000                    |

3.13.3 Where VHF TV, FM broadcasting and FM mobile transmitters are used, electric blasting operations shall not be conducted closer to such operating transmitters than indicated in Table 3.13.3(a) or Table 3.13.3(b).

Table 3.13.3(a)  
VHF Television and FM Broadcasting

| TRANSMITTER POWER<br>Watts | MINIMUM DISTANCE<br>Feet |
|----------------------------|--------------------------|
| 1 - 10                     | 5                        |
| 10 - 100                   | 20                       |
| 100 - 1,000                | 60                       |
| 1,000 - 10,000             | 200                      |
| 10,000 - 100,000           | 600                      |
| 100,000 - 1,000,000        | 2,000                    |

Table 3.13.3(b)  
FM Mobile Transmitters

| TRANSMITTER POWER<br>Watts | MINIMUM DISTANCE<br>Feet |
|----------------------------|--------------------------|
| 1 - 10                     | 5                        |
| 10 - 30                    | 10                       |
| 30 - 60                    | 15                       |
| 60 - 250                   | 30                       |
| 250 - 600                  | 45                       |

3.13.5 Where UHF television transmitters are used, electric blasting operations shall not be conducted closer to such operating transmitters than indicated in Table 3.13.5.

Table 3.13.5  
UHF Television Transmitters

| TRANSMITTER POWER<br>Watts | MINIMUM DISTANCE<br>Feet |
|----------------------------|--------------------------|
| 1 - 10                     | 2.5                      |
| 10 - 100                   | 8                        |
| 100 - 1,000                | 25                       |
| 1,000 - 10,000             | 80                       |
| 10,000 - 100,000           | 250                      |
| 100,000 - 1,000,000        | 800                      |
| 1,000,000 - 5,000,000      | 2,000                    |

- 3.13.6 When electric blasting is to be used near a transmitter where the conditions are not covered by the tables, or a field survey of hazards is warranted, the Commissioner may order such tests made as are deemed necessary. All such tests shall be made by the manufacturers of the blasting cap or by a recognized test laboratory or engineering company.

### **3.14 NOTIFICATION TO MUNICIPALITIES**

- 3.14.1 Whenever blasting is to be conducted in a municipality, other than by a quarrying or underground mining operation, the person conducting the blasting operation shall notify the police department specifying the location and intended time of such blasting.
- 3.14.2 Service of a single notice of intention shall constitute compliance with this section when blasting takes place on more than one day, provided it is a part of a single continuing project.

### **3.15 TIME OF BLASTS**

- 3.15.1 No person shall fire a blast in any surface blasting or tunnel blasting operation between 6:00 p.m. of any day and 8:00 a.m. of the following day unless authorized by the Commissioner. No explosives in surface blasting shall be loaded in drill holes in the dark.
- 3.15.2 No person shall blast on Sunday without special permission from the Commissioner.

### **3.16 INSURANCE**

- 3.16.1 Any self employed person in possession of a valid permit to use explosives for blasting purposes shall have a valid insurance policy covering blasting damage in the minimum amounts of \$50,000 for property damage including explosion, collapse and underground utility and \$100,000-\$300,000 personal injury. This requirement shall not apply to any person who possesses a Grade G (agricultural) permit.
- 3.16.2 Any person in possession of a valid permit to use explosives for blasting purposes who is working for any person, partnership, firm, association, company or corporation shall not use explosives for such person, partnership, firm, association, com-

pany or corporation unless the employer has a valid insurance policy covering blasting damage including explosion collapse and underground utility in the minimum amounts of \$50,000 for property damage and \$100,000-\$300,000 for personal injury.

3.16.3 Proof of the possession of a valid insurance policy covering blasting damage shall be readily available to inspection by the Commissioner, State Police or local police and fire departments.

3.16.4 Nothing in 3.16.1 and 3.16.2 shall be construed as preventing greater insurance policies covering blasting damage when requested by any person, partnership, firm, association, company or corporation for whom blasting is being done.

## **SECTION 4 — HANDLING AND USE OF EXPLOSIVES IN SURFACE BLASTING**

### **4.1 GENERAL**

- 4.1.1 Only persons duly authorized by the blaster shall in any way handle or use explosives.
- 4.1.2 Blasting operations shall in every instance be restricted to as few men as is practicable, and only authorized personnel shall be allowed in the blast area.
- 4.1.3 Explosives shall be kept in original or equivalent containers until they are to be used.
- 4.1.4 Explosives shall not be left lying around.
- 4.1.5 All explosives left over after loading operations are completed shall be promptly returned to their proper magazines.
- 4.1.6 All explosives cases, wooden and fibreboard, sawdust and other rubbish from explosives containers, shall be removed to a safe place for disposal, and shall not be used again for any purpose.
- 4.1.7 In removing supplies of explosives from any magazine, those that have been longest in the magazine shall be taken out first.
- 4.1.8 No tools, except wooden wedges, and non-metallic slitters may be used for opening containers of explosives, except that

metallic slitters may be used for opening fibreboard containers providing such slitters cannot come in contact with the metallic case fasteners or the explosives.

- 4.1.9 No employer or other person not in possession of the required permits shall remove any explosives from any mine, quarry, tunnel or construction site.

## **4.2 RESTRICTIONS**

- 4.2.1 **Loosening of Caked Ammonium Nitrate:** Under no circumstances shall caked ammonium nitrate in bags or in bulk, be loosened by blasting with explosives.
- 4.2.2 **Frozen Explosives:** Frozen explosives shall not be placed or used in drill holes. No attempt shall be made to thaw frozen explosives, but rather the manufacturer shall be consulted.

## **4.3 DRILLING**

- 4.3.1 All drill holes shall be of sufficient bore so that the cartridges of explosives can be easily inserted to the bottom of the hole without forcing or ramming.
- 4.3.2 No person shall drill in or deepen any hole that contains, or has previously contained explosives.
- 4.3.3 Drilling shall not be resumed after blasts have been fired until a thorough examination has been made to make sure that there are no unexploded charges remaining.
- 4.3.4 When drilling and loading are being performed simultaneously in the same area, the two operations shall be separated as widely as practicable, and in no case shall drilling be done closer to a loaded hole, or a hole that is being loaded, than a distance equal to the deepest blast hole in the area, but in no case less than 25 feet.
- 4.3.5 When holes within 10 feet of any structure are to be loaded with explosives, line holes shall be drilled on a line parallel to the structure and as close as possible to same for protection.

## **4.4 ELECTRIC BLASTING**

- 4.4.1 Electric blasting with batteries, blasting machines, light circuits or power circuits is permissible.

- 4.4.2 Only U.S. Bureau of Mines approved type dry cell batteries may be used as a power source and shall be used in accordance with the U.S. Bureau of Mines approval.
- 4.4.3 When firing with blasting machines, the connection, or connections shall be made as recommended by the manufacturer.
- 4.4.4 When firing with light or power current the connections shall be made in series, parallel, in a combination of series and parallel, or in a combination connection recommended by the manufacturer.
- 4.4.5 When firing with light or power current, ample power shall always be used to fire all detonators which have been connected, but under no condition shall the voltage exceed 550 volts.
- 4.4.6 Blasting machines shall be in good condition and the efficiency of the machine shall be tested periodically to make certain that it can deliver power at its rated capacity.
- 4.4.7 The number of electric detonators to be connected to the blasting machine shall not exceed the rated capacity of the machine.
- 4.4.8 All blasting machines shall be in charge of the blaster, and no other person shall connect the leading wires to the machine.
- 4.4.9 When firing with a blasting machine, it shall be located at a safe distance to be determined by the blaster, but not less than 150 feet from the blast area unless other adequate protection is afforded.
- 4.4.10 The following sequence shall be followed in making electric blasting connections, and at no time nor under any condition or circumstances shall the manner of hookup be revised or otherwise changed:
  - (a) Connect detonator wires.
  - (b) Connect detonator wires to leading wires.
  - (c) Connect leading wires to blasting machine or to safety switch.
  - (d) Fire holes from blasting machine or blasting switch.
- 4.4.11 When firing by means of a blasting machine, the leading wires shall:
  - (a) Be kept short-circuited until the shot is ready for firing, when connected to a circuit of electric detonators.

- (b) Not be connected to the blasting machine until immediately before the time of firing.
  - (c) Be disconnected from the blasting machine and short-circuited immediately after firing.
- 4.4.12 The insulation on leading wires shall be in good condition and kept from contact with any electrical conductor, pipe lines, tracks or pools of water or oil.
- 4.4.13 Blasting circuits shall not be grounded at any point, and any bare spots in the circuit, such as wire connections, shall not be allowed to touch the ground.
- 4.4.14 All electric blasting caps shall have the leg wires twisted together or shunted until the holes have been charged to avoid a premature explosion.
- 4.4.15 Electric blasting caps and blasting circuits shall be tested by a silver chloride cell blasting galvanometer especially designed for that purpose.
- 4.4.16 Electric blasting caps should be tested individually with a blasting galvanometer before any stemming is placed in the hole.
- 4.4.17 The blasting circuit shall be tested with a blasting galvanometer before the shot is fired.
- 4.4.18 No electric blasting shall be done under overhead electric lines, or within range of them where it is possible that lead wires might be blown into contact with the electric lines, unless special precautions are taken to hold down the lead wires.
- 4.4.19 Areas to be blasted under high voltage electric lines shall be tested for extraneous electric currents by a competent person using instruments designed for this purpose. Where extraneous electrical currents exceeding 0.06 amps are detected, the use of electrical blasting is prohibited.
- 4.4.20 In any single series in the same blast, electric blasting caps shall be the same brand.
- 4.4.21 At any surface operation where a power circuit is used for blasting, all the applicable provisions of 6.6, 6.8 and 6.9 shall be complied with.

## **4.5 DETONATING FUSE**

- 4.5.1 All detonating fuses shall be covered with stemming of sand, dirt, or fine rock screenings where physically possible, to a depth of at least one foot.
- 4.5.2 When priming blast holes with detonating fuse, it shall be attached to the first primer cartridge to be inserted in the hole, or, it shall be inserted to the bottom of the hole, weighted by some other means.
- 4.5.3 After the primer is in position, and before loading operations continue, the detonating fuse downline shall be cut from the spool.
- 4.5.4 The detonating fuse shall extend at least two to three feet above the collar of the hole, drawn sufficiently taut to remove the slack, and secured where it will not interfere with loading operations or contact nearby explosives.
- 4.5.5 Two detonating fuse downlines shall be used in deep large diameter holes loaded with multiple primers, which are in turn separated by blasting agents, prill-oil mixtures, or cap sensitive explosives and when large primary holes are deck loaded.
- 4.5.6 When two detonating fuse downlines are used they shall be kept separated by placing them on the opposite sides of the hole so they will function independently. If such separation cannot be assured, the two lines shall be twisted together to provide a simultaneous detonation. In either case, the two downlines shall be attached to the trunkline so that both will be initiated at the same instant.
- 4.5.7 Detonating fuse shall be inspected before stemming is placed, and at intervals during stemming to be certain that it is intact at all times.
- 4.5.8 Main or trunk line splices shall be factory splices or tight square knots. No splices shall be used in the drill hole.
- 4.5.9 All branch line connections and all connections in the trunk line, other than splices, shall be tight and at right angles. The section of the branch line that is to be connected to the trunk line shall be kept dry.
- 4.5.10 Main or trunk lines shall be laid out free of kinks or coils, and all connections shall be inspected before firing the blast.

- 4.5.11 When short interval delay firing of detonating fuse is used, the practice shall conform strictly to the manufacturer's recommendations.
- 4.5.12 When connecting a blasting cap or an electric blasting cap to detonating fuse, the cap shall be taped or otherwise attached securely along the side or the end of the detonating fuse, with the end of the cap containing the explosive charge pointed in the direction in which the detonation is to proceed. It is recommended that two detonators be used for this purpose.
- 4.5.13 Detonators for firing the trunk line shall not be brought to the loading area nor attached to the detonating fuse until everything else is in readiness for the blast.
- 4.5.14 Care shall be taken to select a detonating fuse consistent with the type and physical condition of the drill hole, and the type of explosives used.

#### **4.6 LOADING EXPLOSIVES—GENERAL**

- 4.6.1 Machines and all tools not used for loading explosives into bore holes shall be removed from the immediate location of holes before explosives are delivered.
- 4.6.2 No activity of any nature other than that which is required for loading holes with explosives shall be permitted within 25 feet of holes loaded with explosives.
- 4.6.3 Power lines and portable electric cables for equipment being used shall be kept at a safe distance from explosives being loaded into drill holes. Cables within 25 feet of any hole which is loaded, or being loaded, shall be de-energized and locked out by the blaster. This shall apply only to electric blasting.
- 4.6.4 Under no circumstances shall the amount of explosives taken into a blast area exceed the amount estimated by the blaster as necessary for the blast.
- 4.6.5 The loading of explosives charges for any blast which is not to be detonated upon completion of the loading is prohibited unless a guard is stationed at the blast site.
- 4.6.6 No explosives charges shall be permitted to remain in the ground overnight unless permission is first obtained from the Commissioner.

- 4.6.7 When a charge of explosives has been loaded there shall be a constant guard over same until the blast has been fired, and the blaster is satisfied that there has been no misfire.
- 4.6.8 Explosives shall not be removed from the original wrapper before being loaded into bore holes, except when irregularities of the hole make it impossible to load whole cartridges with safety, or in block-holing and pre-splitting, where small charges are desirable. This rule shall not apply to free running or slurry explosives.
- 4.6.9 When loading free running or bulk explosives, a bronze, wooden or heavy paper funnel, or a pneumatic loader shall be used unless the explosives can be poured directly from the container into the hole in such a manner as to prevent scattering of loose explosives around the collar of the hole.
- 4.6.10 The use of pneumatic loaders is prohibited unless application is first made to the Commissioner and written permission is obtained for each particular location.
- 4.6.11 When holes are loaded with a pneumatic loader, the applicable provisions of Section 7 shall be complied with.
- 4.6.12 Explosives shall be stacked in piles not less than 25 feet from the nearest holes being loaded, and any two or more piles shall be so spaced, as provided in 4.6.14, as to prevent propagation of an explosion of these piles in the event of a premature explosion in any portion of the blast area.
- 4.6.13 The explosive containers, if any, shall be opened at the pile and carried up to the hole one case or unit at a time for immediate loading, or placed at the loading station not less than 6 feet from the hole except that not more than 100 pounds of explosives shall be allowed at the loading station at any one time.
- 4.6.14 Explosives shall be distributed in such a manner that the distances from storage piles to the allowable maximum quantity of 100 pounds of explosives at the loading station, or between such 100 pound station piles, shall not be less than the quantities shown in Table 4.6.14.

Table 4.6.14

| EXPLOSIVES |       | DISTANCE BETWEEN PILES<br>OF EXPLOSIVES |
|------------|-------|-----------------------------------------|
| Pounds     |       | Feet                                    |
| Up to      | 50    | 21                                      |
|            | 100   | 25                                      |
|            | 200   | 32                                      |
|            | 300   | 37                                      |
|            | 400   | 41                                      |
|            | 500   | 44                                      |
|            | 750   | 50                                      |
|            | 1000  | 55                                      |
|            | 1500  | 64                                      |
|            | 2000  | 70                                      |
|            | 2500  | 75                                      |
|            | 3000  | 80                                      |
|            | 5000  | 96                                      |
|            | 10000 | 123                                     |

- 4.6.15 When explosives are delivered to the blast area by truck, the delivery shall be so arranged that loading can be started immediately or within an hour. Any truck containing explosives standing at a blast site longer than an hour before loading of drill holes commences, shall comply with Table 4.1.2 of Chapter 192, The Storage of Explosives of Title 12, N.J.A.C. This section shall not be construed as applying to explosive trucks in which explosives are stored in a portable magazine.
- 4.6.16 Explosives shall not be placed or left within 25 feet of an electric light circuit or electric power circuit, except during transportation.
- 4.6.17 No explosives at a blast site shall be left unattended.
- 4.6.18 All tamping poles and dollies shall be constructed of wood or suitable flexible plastic pipe with no exposed metal parts, except that non-sparking metal spikes may be used where necessary to load rough holes, and that non-sparking metal connectors may be used for extending the length of a tamping pole.

- 4.6.19 The end of the wooden tamping pole shall be kept square and of such minimum diameter that the tamping pole will not by-pass the cartridge in the hole. When using plastic pipe a wooden plug shall be placed at the end of the pipe.
- 4.6.20 The exposed parts of tamping dollies shall be constructed of hard wood and may be weighted to sink in water.
- 4.6.21 When a dolly is weighted, no metal parts shall come within  $\frac{1}{2}$  inch of the outside dolly; and the weighting material shall be sealed inside the dolly with wooden plugs driven into and glued in place, to close the holes.
- 4.6.22 The dolly shall not be dropped more than 2 feet upon explosives and shall not be used to force explosives down a hole, or attempt to free a cartridge or loose explosives stuck in the hole during loading operations.
- 4.6.23 Explosives in well drill holes may be tamped with a dolly when tamping is required, but the use of a dolly shall be kept at a minimum.
- 4.6.24 Tamping sticks and dollies shall not be used when they are badly worn, or when pieces of ore, rock, dirt, or similar material is adhered to, or imbedded in, the end of the tamping stick or dolly.
- 4.6.25 Mechanical tamping devices shall be so constructed that no metal parts will enter the bore hole unless such parts are so effectively insulated that no metal can come in contact with the explosives being tamped.
- 4.6.26 Sufficient suitable stemming, or tamping material, shall be placed at the drill holes before delivery of explosives to the drill holes is started.
- 4.6.27 Stemming or tamping material shall be screened or free from excessively coarse pieces and should preferably consist of clean fine clay, sand or crushed rock screenings. The use of leaves, trash or combustible material is prohibited.
- 4.6.28 All blast holes shall be stemmed to the collar or to a point which will confine the charge and minimize the danger of flying material.
- 4.6.29 For toe-holes the collar stemming shall in no case be less than one-third the depth of the hole.

- 4.6.30 Block holes shall contain at least 85 percent stemming material.
- 4.6.31 Before the firing of a blast at any location where the firing of such blast is liable to cause injury to persons or property, the material to be blasted shall be properly covered or protected to safeguard against such injury.
- 4.6.32 All matting for covering blasts shall be a heavy woven matting of rope, steel wire or chain or heavy logs, securely tied together by chains or cables, and shall be of sufficient weight to prevent the scattering of the loosened material. Displacement of such matting due to detonation shall be kept to a minimum.

#### **4.7 FIRING CHARGES—WARNING SIGNALS**

- 4.7.1 It shall be the duty of the blaster to fix the time of blasting.
- 4.7.2 Before firing any blast all means of access to the blast area shall be effectively guarded to keep out all unauthorized persons.
- 4.7.3 The blaster shall make certain all persons are out of the blast area before firing the charge. No blast shall be fired while any person is in the blast area.
- 4.7.4 A code of blasting signals shall be posted at one or more conspicuous places where blasting is being done. All lettering shall be not less than 4 inches in height on a contrasting background.
- 4.7.5 The blaster shall sound a warning distinctly audible to all persons within the danger zone at least five minutes before the charge is to be detonated, and all persons within the danger zone shall retire to a safe distance or to a safe shelter.
- 4.7.6 The last audible signal shall be of at least one minute's duration, at the end of which time the charge will be detonated.
- 4.7.7 No person shall return to the blast area until permitted to do so by the blaster, and a distinctly audible all clear signal has been given.
- 4.7.8 Where highways or buildings are located within the danger zone, employees shall be sent in each direction to warn the public when the shots are to be fired.

## **4.8 FIRING CHARGES—PROXIMITY TO HIGHWAYS**

- 4.8.1 Primary blasting at any quarry shall be prohibited when the blast area is within 50 feet of the right of way of any roadway, horizontally measured.
- 4.8.2 When the floor of a rock cut, is more than five feet below the average grade of a highway at any point within 100 feet of a highway right of way, an effective and approved barrier shall be erected by the quarry operator or contractor along the property line nearest the highway right of way for an approved distance, to provide protection against the drop or fall of vehicles or persons.
- 4.8.3 It shall be the duty of the quarry operator and contractor to safeguard pedestrians and other highway users and their vehicles from injury or damage due to blasting operations.
- 4.8.4 When the blast area is within 300 feet of a highway right of way, the blaster shall just prior to the blast, designate a sufficient number of employees of the operator, each carrying a red flag no smaller than 2 feet in length and 1½ feet in width fastened to a short staff, to stop all vehicular traffic at predetermined points on each possible route of travel in the vicinity of the blast area until the blast has been fired. A check shall be made of the highways in the danger zone to insure that there are no parked vehicles or pedestrians who would be endangered by the blast.
- 4.8.5 When the all clear signal has been given all vehicular and pedestrian traffic shall promptly be allowed to proceed.

## **4.9 LOADING EXPLOSIVES—WARNING SIGNS**

- 4.9.1 Standard type warning signs requesting that no radio transmitting be carried on while passing through the blast area shall be maintained on the right hand shoulder of all public and private roads. The warning signs closest to the blast area shall be approximately 350 feet from the blast area. All lettering shall be not less than 4 inches in height on a contrasting background.
- 4.9.2 Standard type warning signs indicating a blast area shall be maintained at all approaches to the blast area. The warning signs closest to the blast area shall be approximately 350 feet

from the blast area. All lettering shall be not less than 4 inches in height on a contrasting background.

#### **4.10 INSPECTION AFTER BLASTING**

- 4.10.1 Immediately after a blast has been fired, the firing line shall be disconnected from the blasting machine, or where power switches are used they shall be locked open. All blasting lines shall be shunted.
- 4.10.2 Immediately following the blast a thorough inspection shall be made by the blaster to determine if all charges have been exploded before employees are allowed to return to the operation.
- 4.10.3 If a misfire is found, the blaster shall provide proper safeguards for excluding all personnel from the danger zone.
- 4.10.4 All wires shall be carefully traced and search made for unexploded cartridges.
- 4.10.5 A careful lookout shall be maintained for unexploded cartridges in the muck piles. Any found shall be carefully gathered and disposed of in the same manner as required for deteriorated explosives.

#### **4.11 MISFIRES**

- 4.11.1 All misfires shall be reported at once to the quarry operator or contractor.
- 4.11.2 If broken wires, faulty connections or short circuits are determined as the cause of misfire, the proper repairs shall be made, the firing line reconnected, and the charge fired, providing the burden has not been dangerously weakened by other shots.
- 4.11.3 If an additional hole and charges are necessary for the blasting of the misfired charge, the blaster shall be responsible for directing the angle of the hole and the depth to which it shall be drilled, but no drilling shall be done within a distance of 2 feet from a misfired charge.
- 4.11.4 In cases where a misfire is not discovered until the shovel digs into the bank and uncovers the unexploded explosives, the shovel and all other equipment which might throw sparks

or be damaged by an explosion, and all workmen shall be withdrawn to a safe distance.

- 4.11.5 The blaster shall then carefully remove rock broken by the blasts of adjacent holes, maintaining a sharp lookout for loose explosives, until the bore hole containing the charge that failed is exposed.
- 4.11.6 If there is any doubt regarding the safety precautions and method to be used in refiring a misfire, the blaster or his employer shall contact the Department of Labor and Industry, and the explosives manufacturer's representative. The blast area shall be blocked off and guarded until such time as the charge can be refired.
- 4.11.7 When there has been a misfire, the blaster or his employer shall immediately notify the Commissioner.
- 4.11.8 A complete record shall be kept at the quarry office or the contractor's field office showing all misfires, the method of disposal, and the name of the person who refired, or otherwise disposed of such misfired charges.
- 4.11.9 In case a charge fires, but does not bring down the burden, it is permissible to reload the bore hole, if in suitable condition, but only after the temperature of the hole has been reduced by water or otherwise to not more than 150 degrees F.

## **SECTION 5 — SURFACE BLASTING METHODS**

### **5.1 PRIMARY BLASTING**

- 5.1.1 A primary blast shall be planned before the loading is started, and the planned charge for each hole shall be recorded.
- 5.1.2 The condition of each hole to be loaded and the amount, height and position of the explosive charge or charges placed in the hole shall be recorded on the loading chart.
- 5.1.3 Holes shall be checked prior to loading to determine depth and condition. Large diameter drill holes may be checked with a dolly, tamping block, measuring tape or by visual inspection with the aid of mirrors.
- 5.1.4 After any explosives have been loaded all measuring shall be done with a cloth tape or non-ferrous measuring device and

a lead plumb bob, or a wooden tamping pole or wooden dolly free of exposed metal parts.

- 5.1.5 Rough or ragged holes, and holes partly closed by an obstruction that don't permit loading full cartridges, shall be cased, loaded with explosives that flow freely or have been cut in small pieces.
- 5.1.6 Water shall be removed from wet holes or such holes shall be loaded with explosives suitable for use in wet work.
- 5.1.7 Explosive cartridges shall not be dropped in a drill hole unless the hole is free from obstructions throughout its entire length.
- 5.1.8 Large diameter cartridges that have been wedged in a drill hole shall not be tamped with a dolly. After pouring water in the hole, attempts to dislodge or pierce them shall be made with a spear-shaped wooden tamping block or a small diameter wooden pole, such as recommended by the explosives manufacturer.
- 5.1.9 When loading a long line of holes with more than one loading crew, the crews shall be separated by the greatest practical distance which can be maintained as the loading progresses, and which is consistent with efficient operation and supervision of crews. Every effort shall be made to keep the loading crews a minimum of 25 feet apart and to prevent the simultaneous loading of adjacent holes.
- 5.1.10 No hole shall be loaded until ready to be fired. All loaded holes shall be included in the same blast unless they are 100 feet or more from the nearest hole being fired.
- 5.1.11 Quantities of explosives that may be used in primary blasting shall be governed by the allowable limits as set forth in this Chapter.

## **5.2 SECONDARY BLASTING**

- 5.2.1 No tools or equipment or activity of any kind shall be permitted on a muck pile directly above a blaster while he is loading explosives into block holes.
- 5.2.2 When explosives are not confined in a drill hole, not more than 10 pounds of explosives shall be detonated at any one time in a secondary shot.

- 5.2.3 No person except the blaster and any others directly engaged in loading block holes, shall be permitted within the immediate area while loading is being performed.
- 5.2.4 Loading of any block hole shall be completed in one continuous operation, including insertion of the primer and stemming.
- 5.2.5 Drill holes for secondary blasting shall be drilled deep enough to accommodate the charge of explosives, as well as sufficient stemming to confine the charge.

### **5.3 SPRINGING DRILL HOLES**

- 5.3.1 Drill holes shall not be sprung within 100 feet of any holes containing explosives.
- 5.3.2 A hole that has been sprung shall not be loaded until a sufficient time has elapsed for the hole to cool. Artificial means may be used to cool the hole.

## **SECTION 6 — HANDLING AND USE OF EXPLOSIVES IN MINES AND TUNNELS**

### **6.1 GENERAL**

- 6.1.1 All provisions of Sections 4 and 5 which are applicable to the handling and use of explosives in mines and tunnels shall be complied with.

### **6.2 RESTRICTIONS**

- 6.2.1 **Field Mixing of Ammonium Nitrate—Fuel Oil:** The compounding or mixing of ammonium nitrate and sensitizing materials in a mine or tunnel is prohibited.
- 6.2.2 **Safety Fuse and Caps:** The use of safety fuse and caps in tunnels is prohibited unless written permission is first obtained from the Commissioner.
- 6.2.3 **Frozen Explosives:** Frozen explosives shall not be placed or used in drill holes. No attempt shall be made to thaw frozen explosives, but rather the manufacturer shall be consulted.

### 6.3 CONTROL OF TOXIC GASES—FUME CLASS

- 6.3.1 The fume classification of an explosive shall be determined from the standard procedures as used by the United States Bureau of Mines for establishing the fume classification of permissible explosives.
- 6.3.2 The total volume of carbon monoxide and hydrogen sulphide produced by a  $1\frac{1}{4}$  x 8 inch cartridge of explosive, and except as provided in 6.3.6, shall be as given in Table 6.3.2.

Table 6.3.2

|                                             |
|---------------------------------------------|
| Fume Class 1 — Less than 0.16 cubic feet    |
| Fume Class 2 — From 0.16 to 0.33 cubic feet |
| Fume Class 3 — From 0.33 to 0.67 cubic feet |

- 6.3.3 No explosive shall be used underground in the presence of combustible gases and/or combustible dusts unless conditions of use have been described to the Commissioner by the employer or his representative, and accepted by the Commissioner as safe.
- 6.3.4 Explosives for underground work shall not generate hazardous fumes in greater quantities than those generated by high explosives classified Fume Class 1.
- 6.3.5 All containers of explosives for underground use shall be clearly marked in  $\frac{1}{4}$  inch or larger letters with the appropriate fume classification.
- 6.3.6 No explosives other than those in Fume Class 1 shall be used provided however that:
- (a) Explosives complying with the requirements of Fume Class 2 and Fume Class 3 may be used if the operator has made specific application to and has shown to the satisfaction of the Commissioner that adequate ventilation has been provided.
  - (b) When the Commissioner or the operator has reason to believe that use of Fume Class 1 explosives may endanger employees by ignition of combustible dusts or gases, permissible explosives may be used and the ventilation increased to compensate for the resulting increase of poisonous gases.

- 6.3.7 All explosives packed in cartridges shall be loaded in the original cartridge without alteration of the quantity of the wrapping.

#### **6.4 CONTROL OF TOXIC GASES—VENTILATION AND TESTS**

- 6.1.1 Efficient and adequate ventilation shall be provided so that the atmosphere where men are working contains at least 19.5 percent oxygen, not more than 0.5 percent carbon dioxide, and no harmful or dangerous quantities of dust, noxious gases, or flammable gases.
- 6.4.2 Muck piles shall be sprinkled with water before any attempt is made to remove the broken rock.
- 6.4.3 When the air in any part of a mine or tunnel is known to contain, or is suspected of containing a dangerous accumulation of gas, it shall be tested before anyone is allowed to work therein.
- 6.4.4 No one shall be permitted to work or be in a dangerous accumulation of gas unless he is wearing permissible respiratory equipment adequate for his protection.
- 6.4.5 If the main return in a mine or tunnel contains flammable gases or vapors, any work conducted therein shall be conducted with extreme care.
- 6.4.6 If the main return of a mine or tunnel contains more than 25 percent of the lower explosive limit of any flammable gas or vapor, the employees shall be withdrawn until the condition is corrected.
- 6.4.7 When a poisonous or suffocating gas in harmful concentrations is encountered, normal operations shall cease in those places, except that under competent direction, necessary steps may be taken to make the place safe.
- 6.4.8 The accumulation of any gas shall not exceed the limits set forth in Chapter 131, Threshold Limit Values of Title 12, N.J.A.C.
- 6.4.9 A dangerous accumulation of methane is any mixture of methane and air in which the proportions of methane is one percent or more by volume.

- 6.4.10 Tests for flammable gases shall be made with a permissible detector, or by chemical analysis.
- 6.4.11 Tests for any gas other than flammable gas shall be made by chemical analysis or by the use of a standard testing device designed to detect the particular gas for which the test is being made, and to measure its concentration.
- 6.4.12 Tests for gases shall be made by a person familiar with the hazards of both flammable and noxious gases and who is proficient in the use of the respective testing devices. The employee so designated shall keep a dated record of all tests which shall be available to the Commissioner upon request.
- 6.4.13 Tests for flammable and noxious gases shall be made:
- (a) Before explosives are brought to the blast site.
  - (b) After the charge has been detonated.

## **6.5 USE OF SAFETY FUSE**

- 6.5.1 Blasting with safety fuse employing hand lighting methods shall not be permitted in shaft sinking, winzes and raises more than 50 feet in height, and in cutting shaft stations, in drifts, cross-cuts or other places where blasting is hazardous to blasters, or where there is not sufficient protection from flying rock or concussion.
- 6.5.2 The average burning rate of safety fuse shall be determined by burning not less than 3 foot lengths in open air. The burning rate shall be redetermined with each new shipment, and at least every sixty days. Any fuse which has a burning rate varying more than 10 percent from one foot in 40 seconds shall not be used.
- 6.5.3 The average burning rate shall be posted on bulletin boards, or other conspicuous places where it can be seen by all employees.
- 6.5.4 It is forbidden to use fuse that has been hammered or injured in any way.
- 6.5.5 The hanging of fuse on nails or other projections which will cause a sharp bend to be formed in the fuse is prohibited.
- 6.5.6 In capping safety fuse, at least one inch shall be cut from the end of each coil of fuse to be used.

- 6.5.7 Only a cap crimper of standard design shall be used for attaching blasting caps to safety fuse. The practice of crimping with teeth, knife, or any tool other than a crimper, is forbidden. The employer shall keep in accessible places, ready for use, crimpers in good repair.
- 6.5.8 Blasting caps shall not be removed from original containers, except as they are used for capping fuses.
- 6.5.9 The use of oil or grease to waterproof joints between the cap and fuse may injure the fuse and cause misfires. Therefore, waterproofing shall be done by using an approved ring-type crimp device or compound especially prepared for water proofing.
- 6.5.10 No blasting cap used shall be of less strength than No. 6.
- 6.5.11 No unused cap or short capped fuse shall be placed in any hole to be blasted; such unused detonators shall be removed from the working place and destroyed.
- 6.5.12 No fuse shall be capped, or primers made up in any magazine, nor near any running belt or open light, or near any source of ignition or electrical current. Special benches for this purpose shall be provided at least 25 feet distant from such places.
- 6.5.13 No employer or other person shall be permitted to carry loose caps of any kind in his clothing.
- 6.5.14 At least two men shall be present at each location where cap and fuse blasting is done by hand lighting methods provided, however, that where no more than five fuses are to be ignited at one time, the presence of a second man is not required.
- 6.5.15 The so-called "drop fuse" method of dropping or pushing a primer or any explosive with a lighted fuse attached to it is positively forbidden.
- 6.5.16 The use of cap and fuse for firing mud cap charges is prohibited unless charges are separated sufficiently to prevent one charge from dislodging other shots in the vicinity.
- 6.5.17 Unless fuse of a type incorporating an inner plastic jacket is used it is forbidden to use methods of attaching the capped fuse to the primer cartridge which involve half-hitching the fuse around the cartridge, or reversing or otherwise causing

short bends in the fuse. It is recommended that the fuse be laced through the cartridge or that the string-tied method or other equally effective means be used.

- 6.5.18 When blasting with safety fuses, consideration shall be given to the length and burning rate of the fuse, condition of the blaster's traveling way and the distance to a place of safety.
- 6.5.19 All safety fuses shall be sufficiently long to extend beyond the collar of the hole, and in no case shall be less than 3 feet in length.
- 6.5.20 Only single shots shall be fired when using 3 foot fuses.
- 6.5.21 When lighting safety fuses, the fuses shall be so timed that no charge will explode until at least two minutes after the last fuse in the blast area has been ignited.
- 6.5.22 When two or more safety fuses in a group are lighted as one by means of igniter cord or other similar fuse-lighting device, they may be considered as one fuse for the purpose of this section.
- 6.5.23 Unless igniter cord or other similar fuse lighting device is employed, fuse used in any round which consists of two or more holes shall be cut at least 6 feet long.
- 6.5.24 After any blast no person shall return to the blast area within thirty minutes. If there is any doubt that all shots have been fired, no person shall return to the blast area within one hour.

## **6.6 ELECTRIC BLASTING—LIGHT OR POWER CIRCUITS**

- 6.6.1 Electrical current from light or power circuits shall not be used for firing shots, except where the electrical connections to such light or power circuits are made within an enclosed switchbox.
- 6.6.2 All blasting wires and circuits shall be kept well in the clear from power lines, pipe lines, tracks and other sources of possible electric currents.
- 6.6.3 Blasting lines shall run on the side of the workings opposite all power and lighting circuits and shall be properly hung on insulators.

- 6.6.4 No electric firing shall be done with a power line voltage of less than 110 volts or more than 550 volts.
- 6.6.5 Electric circuits from the blasting switch to the blast area shall be insulated, isolated and no ground shall be permitted.
- 6.6.6 Permanent blasting lines, firing switches and auxiliary switches shall be maintained in proper condition at all times.
- 6.6.7 All power lines of any type within 100 feet of a blast area where electric blasting operations are being carried on, shall be de-energized during the loading and blasting.
- 6.6.8 The blasting circuit shall be tested before firing the shots and only a galvanometer especially designed for blasting circuits shall be used for such testing.
- 6.6.9 Before adopting any system of electrical firing, the blaster shall conduct a thorough survey for extraneous currents and if 0.06 amperes or more are detected, such extraneous currents shall be eliminated before any holes are loaded. It is recommended that the test be made with an instrument designed for this purpose.
- 6.6.10 All metal pipes and rails shall be electrically bonded together and grounded at or near the portal or shaft.
- 6.6.11 Where electric haulage is used, and the rails are used as the return circuit, the rails shall be bonded at each point and cross-bonded at intervals not to exceed 200 feet. In addition, all pipe lines shall be cross-bonded to the rails and grounded at intervals not to exceed 1,000 feet.
- 6.6.12 Whether or not especially designed for blasting, the firing switch shall conform to the following minimum standards:
  - (a) It shall be an externally operable switch enclosed in a tight case provided with a lock.
  - (b) It shall be a double pole, double throw switch with the handle arranged to be locked in the "off" position only.
  - (c) It shall be provided with a bar for short-circuiting leading wires when the switch is in the "off" position.
  - (d) The switch shall be fused and should be of 60 ampere capacity.

- (e) The switch shall be mounted so that the handle is down when the switch is in the "off" position. The leading wires shall be attached to the blade terminals and the power lines to the up-throw terminals.
- 6.6.13 When firing by means of a light or power circuit, such circuit shall at all times be broken in at least one place by a lightning gap of at least 5 feet between the blasting switch and power switch, except during the actual firing operation.
- 6.6.14 The connection at such gap shall be made by means of a cable and a two-pole, 60 ampere capacity plug and receptacle. The plug shall be provided with a device, preferably of the automatic type, for short-circuiting the wires when the plug is removed from the receptacle.
- 6.6.15 One or more safety switches shall be placed in the firing line in addition to the blasting switch used for firing the blast. Such switches shall be as described in 6.6.12 except that they need not be fused.
- 6.6.16 Safety switches shall be installed at the beginning of any branch or sections and in the firing line approximately every 500 feet. Such switches shall be as described in 6.6.12 except that they need not be fused.
- 6.6.17 Permanent and temporary leading wires, except for the lightning gap, shall be Type "S" cable or equivalent, or shall consist of two rubber-covered aluminum or copper wires.
- 6.6.18 Rubber-covered wires used for permanent leading wires shall be installed in conduit or shall be strung on insulators and kept at least 5 inches apart.
- 6.6.19 All leading wires shall have sufficient capacity to carry the firing current and shall in no case have a capacity of less than copper wire of No. 14 American Wire Gage.
- 6.6.20 The current carrying capacities of aluminum conductors shall be taken as 84 percent of the same sizes of copper conductors with the same kind of insulation.
- 6.6.21 All splices shall be well made, and shall be so joined as to be electrically and mechanically secure. Splices shall be taped or otherwise effectively insulated.

- 6.6.22 Connecting wires shall be insulated single solid wires with a current-carrying capacity not less than that of copper wire of No. 20 American Wire Gage.
- 6.6.23 Bus wires shall not be smaller than No. 16 American Wire Gage solid bare copper wire.
- 6.6.24 Bus wires and connecting wires shall be short-circuited up to the time they are connected to the leading wires.
- 6.6.25 Leading wires shall be short-circuited by twisting the bare ends together up to the time these wires are connected to the permanent blasting line.
- 6.6.26 The firing switch should be at a safe location outside of the portal of the tunnel, or not less than 1,500 feet from the face of the tunnel if the tunnel length exceeds 1,500 feet.

## **6.7    LOADING EXPLOSIVES—GENERAL**

- 6.7.1    Machines and tools not used for loading explosives into bore holes shall be removed from the immediate location of holes before explosives are delivered to the blast area.
- 6.7.2    Loading operations shall be carried on with the smallest practical number of persons present, and no one but authorized personnel shall be allowed in the blast area.
- 6.7.3    The amount of explosives taken into a blast area shall not exceed the amount estimated by the blaster as necessary for the blast.
- 6.7.4    The loading of holes shall take place just before blasting time, and no holes shall be loaded and left standing.
- 6.7.5    All explosives packed in cartridges must be loaded in the original cartridge without alteration of the quantity of the wrapper.
- 6.7.6    Floodlights or permissible electric cap lamps, or permissible flashlights shall be used as illumination for loading operations. If current for flood lights is supplied by batteries of an electric locomotive, these lights shall be placed no closer than 50 feet from the loading operation. No metal case flashlights shall be used.

- 6.7.7 Loading shall not commence until all drilling operations are completed and the drill holes are cleaned or blown out.
- 6.7.8 The use of pneumatic loaders is prohibited unless application is first made to the Commissioner and written permission is obtained for each particular location.
- 6.7.9 When holes are loaded with a pneumatic loader, the provisions of Section 7 shall be complied with.
- 6.7.10 Under no circumstances shall a workman be permitted to climb a "hung up" chute to blast it loose. A blasting stick, with the explosives securely fastened thereon, shall be used for this purpose.
- 6.7.11 There shall be no activity of any kind that would create a definite hazard to explosives that have been placed, or are being placed, for secondary blasting.

## **6.8 BLASTING**

- 6.8.1 It shall be the duty of the employer or the blaster to fix the time of blasting.
- 6.8.2 When practicable, blasting shall be done at the end of the working shift.
- 6.8.3 Before firing a blast, warning shall be given, and all possible entries into the blasting area and any entrance to any working place where a drift, raise or other opening is about to be made through shall be carefully guarded.
- 6.8.4 The blaster shall make sure that all persons are out of the blast area before firing a blast.
- 6.8.5 Not more than one chute or grizzly in the same area shall be blasted at a time and every precaution shall be used in guarding all approaches leading to the chute or grizzly about to be blasted.
- 6.8.6 When shots in secondary blasting are to be fired in such close proximity that one shot may displace another, the firing shall be done by use of detonating fuse or instantaneous electric blasting caps.
- 6.8.7 Keys to the shot firing and safety switches shall be kept in the possession of the blaster.

- 6.8.8 When necessary to make repairs, extensions or tests on the blasting or shot firing line, the blaster shall unlock the padlocks and remain at the switch until he can relock it or designate that responsibility to someone who reports back to him with the keys when work is completed. No preparations for loading or blasting shall be done until switches are relocked and the keys back in the possession of the blaster.
- 6.8.9 Before connecting the leading wires to the leg wires, the blaster shall make sure that the safety switch or switches are locked in the "off" position, that the lightning gap is open and the short-circuiting device is in place, and that the firing switch is locked in the "off" position.
- 6.8.10 The following procedure shall be used when firing a shot:
- (a) Before the leg wires have been connected to the leading wires, the blaster shall cause all persons to leave the blast area and proceed to a safe location. Leading wires shall be connected to the leg wires, unreeled by the blaster as he leaves the face and connected to the terminals of the permanent firing line.
  - (b) Safety switches shall be closed as the blaster retreats and the lightning gap closed between the power and blasting switches.
  - (c) The power switch shall be unlocked and the handle moved to an "on" position. The blasting switch shall be unlocked and moved to the "on" position to fire the shot.
  - (d) Immediately, the blaster shall return the handle of the firing switch to "off" position and lock it, and then re-open the lightning gap.

## **6.9 PROCEDURE AFTER BLASTING**

- 6.9.1 No one shall enter the place where the blasting has been done until the leading wires have been disconnected from the source of electrical energy, and the firing switch and auxiliary switch or switches have been locked in the "off" position.
- 6.9.2 After a blast, no workman shall return to the area until sufficient time has elapsed for the removal of all toxic gases and smoke and the air is clear enough to distinguish loose or dangerous ground.

6.9.3 In case the shot fails to fire, the blaster shall:

- (a) Lock the firing switch in the "off" position and open the lightning gap.
- (b) Wait at least 15 minutes before proceeding to the safety switch or switches, which he shall lock in the "off" position before entering the blast area.

6.9.4 The blaster shall carefully examine the work place after a blast for missed holes and unexploded caps or explosives before allowing other personnel to enter the blast area.

## **6.10 MISFIRES**

6.10.1 No other work shall be done except that necessary to remove the hazard, and only those persons necessary to do the work shall remain in the danger zone.

6.10.2 No attempt shall be made to extract explosives from any charged or misfired hole; a new primer shall be put in and the hole reblasted, or the explosives may be removed by washing out with water or where the misfire is under water, blown out with air.

6.10.3 No drilling or picking shall be permitted at the face until all missed holes have been detonated.

6.10.4 No employer shall be permitted to drill in any part of a boot-leg hole which has been left standing from a previous blast.

6.10.5 A complete record shall be kept at the job site showing all misfires, method of disposal, and the name of the person who refired, or otherwise disposed of such misfired charges.

## **SECTION 7 — PNEUMATIC EXPLOSIVES LOADING**

### **7.1 GENERAL**

7.1.1 Drill holes shall be loaded by a method acceptable to the Commissioner.

7.1.2 No pneumatic loading shall be allowed at any location until permission has been granted in writing by the Commissioner.

## **7.2 LOADING EQUIPMENT—DESIGN AND CONSTRUCTION**

- 7.2.1 The air loader and all accessory equipment, other than ground connections shall be constructed of materials compatible with the ammonium nitrate composition. No copper, zinc or galvanized metal shall be used.
- 7.2.2 The air loader loading pipe, funnel, and all fittings and connections between the air loader and the discharge end of the loading pipe shall be constructed entirely of non-sparking, electrically conductive material.
- 7.2.3 The pot or hopper of the closed type of air loader shall be of sufficient strength to withstand a hydrostatic pressure test of 150 pounds per square inch.
- 7.2.4 The air loader pot or hopper shall be self-supporting in an upright position. This may be accomplished by special design or by a suitable stand to which the pot or hopper may be secured.
- 7.2.5 A screen of non-sparking material of 20 mesh size, or an air filter or a trap of equivalent filtering capacity, shall be in the air supply line adjacent to the air loader to remove solid particles from the compressed air.

## **7.3 AIR TEMPERATURE AND PRESSURE**

- 7.3.1 The temperature of the air supplied to the air loader shall not exceed 150 degrees F.
- 7.3.2 An air pressure reducing regulator of standard manufacture shall be installed in the air supply line.
- 7.3.3 The maximum air pressure to the loading hose shall not exceed the manufacturer's recommendations and shall be tested at operating pressure prior to the start of the loading operations.
- 7.3.4 An air pressure relief valve of standard manufacture shall be installed in the air supply line between the air pressure reducing regulator and air loader. The relief valve shall be of the direct spring-loaded type, set to operate at 10 percent above the operating pressure.
- 7.3.5 A pressure gauge shall be installed in the air supply line between the air pressure reducing regulator and the air loader in

such position as to be easily read by the operator when in his working place.

#### **7.4 STATIC ELECTRICITY AND STRAY CURRENTS**

- 7.4.1 All pneumatic and air pressure equipment used for loading blasting agents shall be adequately grounded to dissipate static electric charges that may be generated during the loading operation.
- 7.4.2 Loading equipment mounted on a car and rails shall be thoroughly insulated from the car and rails and grounded by a separate static-dissipating ground.
- 7.4.3 No loading operations shall be performed during an electrical storm.
- 7.4.4 The machine or hopper, discharge hose, fittings, discharge tube, and loading tube shall form a continuous electrically conductive path to a ground.
- 7.4.5 Water lines, air lines, fan lines, rails or the permanent electrical grounding systems, shall not be used to ground pneumatic loading equipment.
- 7.4.6 Loading shall not be attempted unless suitable precautions are taken to reduce static electricity and stray current to a safe level.
- 7.4.7 A definite earth ground showing a resistance not to exceed one megohm (1,000,000 ohms) shall be established. An instrument for determining ground resistance shall be kept on hand, and ground resistance checked daily while the loader is being used.
- 7.4.8 Metal or low resisting loading tubes shall not be used.
- 7.4.9 The hose leading from the loader to the holes being loaded shall be of semi-conductive material having a resistance in ohms per foot of not less than 5,000 ohms or more than 30,000 ohms.
- 7.4.10 The air supply shall be connected to the air loader by means of a non-conductive hose.
- 7.4.11 When the relative humidity is less than 65 percent:
  - (a) Electric detonators shall not be used except for collar priming.
  - (b) Safety fuse or detonating fuse shall be used for bottom priming.

- 7.4.12 All detonator leg wires shall be kept shunted until ready to hook up to the firing unit.

## **7.5 LOADING IN BOREHOLES**

- 7.5.1 The air supply line shall be thoroughly blown out before it is attached to the air loader.
- 7.5.2 Air used for pneumatic loading of blasting agents shall be free of excessive moisture and oil.
- 7.5.3 Free flowing blasting agents and water based explosives shall be poured into the air loader through a funnel and screen of electrically conductive non-sparking material. The screen shall be grounded and bonded to the machine. Openings in the screen shall not be larger than two mesh nor smaller than three mesh.
- 7.5.4 Loading tubes shall be at least two feet longer than the deepest hole being loaded.
- 7.5.5 Only free flowing blasting agents and water based explosives shall be used in an air loader.
- 7.5.6 Air loaders and loading lines used for loading explosives shall not be used for stemming purposes.
- 7.5.7 Before blowing stemming into a loaded hole or cavity with an air loader, sufficient stemming shall be pushed in with a tamping stick to prevent blowing the stemming directly against the explosives.
- 7.5.8 All tamping poles shall be constructed of wood or suitable flexible plastic pipe with no exposed metal parts, except that non-sparking metal spikes may be used where necessary to load rough holes, and that non-sparking metal connectors may be used for extending the length of a tamping pole.
- 7.5.9 When loading over electric blasting cap wires, contact between any metal part of the loader and cap leg wires shall be avoided.
- 7.5.10 Holes shall not be lined with non-conductive material which would prevent the charged blasting agent particles from discharging to the borehole walls.
- 7.5.11 Primers which contain a blasting cap, electric blasting cap or delay blasting cap shall not be handled by persons who have

previously been operating pneumatic loading devices unless that person has grounded himself to bleed off static charges.

7.5.12 All loading equipment shall be removed from the area before leg wire shunts are removed and the loaded holes are tied in for blasting.

7.5.13 The air loader and loading shall be cleaned thoroughly after use, not later than the end of the shift during which it was used.

## **SECTION 8 — AMMONIUM NITRATE—FUEL OIL**

### **8.1 GENERAL**

8.1.1 The storage of blasting agents shall comply with Chapter 192, The Storage of Explosives of Title 12, N.J.A.C.

8.1.2 Only persons duly authorized by the blaster shall in any way handle, use or compound blasting agents.

### **8.2 RESTRICTIONS**

8.2.1 Except when blasting agents are compounded at the blast site for immediate use, any such mixing or compounding shall be deemed to be manufacturing of explosives and shall be subject to all applicable provisions of the Explosives Act.

8.2.2 Mobile equipment designed for mixing in transit is prohibited.

### **8.3 COMPOSITION**

8.3.1 No liquid fuel with flash point lower than that of No. 2 diesel fuel oil shall be used.

8.3.2 Crude oil, crankcase oil and more volatile fuels such as gasoline or kerosene shall not be used.

8.3.3 If solid fuels are used, they shall be chosen to minimize dust explosion hazard.

8.3.4 Metal dusts (aluminum power, etc.) peroxides, chlorates and perchlorates, and explosive substances such as nitro-glycerin or other high explosives, shall not be used to sensitize ammonium nitrate unless the strict standards of normal explosive-plant operations are met.

- 8.3.5 No unusual compositions shall be attempted except under the supervision of competent personnel able to evaluate the possibility of new hazards in the operation, and equipped to determine the sensitivity of the resulting compositions.

#### **8.4 BLAST HOLE MIXING**

- 8.4.1 Smoking or open lights, matches or other flame producing devices shall not be permitted within 50 feet of the mixing site.
- 8.4.2 The area surrounding the mixing site shall be kept free of rubbish, dry grass, or other combustible materials for not less than 50 feet in all directions.
- 8.4.3 Fuel oil shall be poured so that it will not spill onto clothing.
- 8.4.4 Mixing shall be done using equipment, materials and methods approved by the Commissioner as adequate to provide for proper and safe admixture without frictional heating, compaction or confinement.
- 8.4.5 Such mixing shall be done in quantities and at locations which shall be appropriate to minimize requirements for storage, handling and transportation of blasting agents.
- 8.4.6 Broken bags or broken cartridges of blasting agents shall immediately be closed up and removed.

### **SECTION 9 — RECORDS**

#### **9.1 GENERAL**

- 9.1.1 A record shall be kept of every blast and all records shall be retained at least until the end of the calendar year next following the year in which the record is made. All such records shall be open to inspection by the Commissioner.
- 9.1.2 One copy of the minimum recorded data covering every blast shall be forwarded to the Department by the blaster under whose supervision the blast was fired, if a request for such data has been demanded, in writing, by the Commissioner.
- 9.1.3 At least one copy of the records required by this Section shall maintained at the quarry, mine office or construction blasting site at all times.

## **9.2 INVENTORY**

- 9.2.1 A continuous inventory of explosives purchased for any given construction project, shall be kept at the site.
- 9.2.2 A continuous inventory of explosives purchased for any mine or quarry shall be kept at the plant office.
- 9.2.3 All inventory records shall conform to 7.4.4 of Chapter 190, Explosives Permits and Fees of Title 12, N.J.A.C.

## **9.3 MINIMUM RECORDED DATA—PRIMARY BLASTING**

- 9.3.1 Plan of blast site shall include:
  - (a) Involved portion of the quarry or construction site showing the location and spacing of holes.
  - (b) Typical cross-section showing overburden, burden at top and toe of face, height of face, depth of holes, kind and quantity of explosives including distribution of explosives, and length and kind of stemming material.
- 9.3.2 Additional data shall include:
  - (a) Kind of blasting cap, distribution of instantaneous or short-period delay blasting caps or both, delay interval used and the order or firing.
  - (b) Maximum amount of explosives per delay.
  - (c) Drilling record showing unusual joint or seam conditions in the rock.
  - (d) Comments by blaster regarding character of breakage, height of breakage, length of throw, effectiveness of shot and unusual results or effects.
  - (e) Weather conditions including the direction and approximate velocity of wind, atmospheric temperature, relative humidity and cloud conditions.
  - (f) Date and time of firing blast.
  - (g) Name of person in responsible charge of loading and firing, and blasting permit number.
  - (h) Name and location of quarry or construction site.
  - (i) Signature of blaster making the report.

- 9.3.3 Any person using the services of a weather forecasting service for blasting operations shall include all data received from the weather service on the blast report.

#### **9.4 MINIMUM RECORDED DATA—SECONDARY BLASTING**

9.4.1 The recorded data shall include:

- (a) The number of holes.
- (b) Kind and quantity of explosives.
- (c) Kind of blasting caps and delay interval.
- (d) Date and time of firing.
- (e) The name of person in responsible charge of loading and firing, and blasting permit number.
- (f) Signature of blaster making the report.
- (g) Name and location of quarry or construction site.

#### **9.5 MISFIRES**

9.5.1 The recorded data shall include:

- (a) Involved portion of the quarry mine or construction site.
- (b) Date of misfire.
- (c) Number of holes involved in misfire.
- (d) Cause of misfire.
- (e) Method used to reblast misfire.
- (f) Name of blaster in responsible charge of handling misfire.
- (g) Signature and title of person making the report.

#### **9.6 SEISMOGRAPH RECORDS**

If seismograph or air pressure readings, or both, are taken upon authorization of the quarry or mine operator or contractor, a copy of the covering seismograph report shall be forwarded to the Commissioner without delay, together with a copy of the records required to be maintained by 9.3.2.

## **9.7 RECORDED SEISMOGRAPH DATA**

### **9.7.1 The recorded data shall include:**

- (a) Identification of instrument used.
- (b) Name of observer.
- (c) Name of interpreter.
- (d) Distance and direction of recording station from area of detonation.
- (e) Type of ground at recording station or location in structure.
- (f) Maximum amplitudes for all components, as well as resultant for all recorded frequencies of vibrations.
- (g) Duration of motion in excess of one one-thousandth of an inch.
- (h) Frequency of ground motion in cycles per second.
- (i) Maximum energy ratio or particle velocity.
- (j) A copy of the photographic records of seismograph readings.

## **SECTION 10 — SEISMIC EFFECTS**

### **10.1 ALLOWABLE LIMITS**

10.1.1 Blasting activities shall be so conducted that ground vibrations measured at the nearest structure or building do not exceed the standards established in this Chapter.

10.1.2 Allowable limits of ground motion, energy ratio and particle velocity contained in this section shall be considered not to produce structural damage in any structure that has been reasonably well constructed according to accepted engineering practice.

### **10.2 RESTRICTIONS ON QUANTITY OF EXPLOSIVES**

The use of explosives within the limitations of this Chapter shall only be undertaken with quantities of explosives not in excess of those permitted by 10.4 and except as further restricted by other requirements of this Chapter.

### 10.3 SPECIAL EXPLOSIVES QUANTITY LIMITS

When ground characteristics for any specific blasting location have been determined by instrumentation, the allowable quantity-distance relations between the amount of explosives used and the distance from the blast site shall be determined from the accepted results of instrumentation at the given operation for the various weights of explosives. The general vibration measurements shall not exceed that established in this Chapter.

### 10.4 ALLOWABLE QUANTITIES OF EXPLOSIVES

10.4.1 In the absence of approved methods of instrumentation to restrict vibrations to the levels specified in this Chapter, the quantity of explosives used in blasting shall not exceed the quantities in Tables 10.4.2 or 10.4.3.

Table 10.4.2  
Quarry Blasting Quantity-Distance

| DISTANCE FROM BLAST AREA TO<br>NEAREST STRUCTURE, NEITHER<br>QUARRY OWNED NOR LEASED | MAXIMUM QUANTITY OF<br>EXPLOSIVES PER SHOT FOR<br>INSTANTANEOUS FIRING OR<br>PER DELAY FOR DELAY FIRING |
|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
| Feet                                                                                 | Pounds                                                                                                  |
| 100                                                                                  | 75                                                                                                      |
| 200                                                                                  | 92                                                                                                      |
| 300                                                                                  | 116                                                                                                     |
| 400                                                                                  | 140                                                                                                     |
| 500                                                                                  | 176                                                                                                     |
| 600                                                                                  | 209                                                                                                     |
| 700                                                                                  | 259                                                                                                     |
| 800                                                                                  | 330                                                                                                     |
| 900                                                                                  | 403                                                                                                     |
| 1000                                                                                 | 495                                                                                                     |
| 1200                                                                                 | 770                                                                                                     |

Table 10.4.3  
Construction Blasting Quantity-Distance

| MAXIMUM QUANTITY OF<br>EXPLOSIVES PER SHOT FOR<br>INSTANTANEOUS FIRING OR<br>PER DELAY FOR DELAY FIRING<br>Pounds | DISTANCE FROM BLAST<br>AREA TO NEAREST<br>BUILDING OR STRUCTURE<br>FOR TRENCHING,<br>TUNNELS, SHAFTS, SIDE<br>HILL OR THROUGH CUTS<br>Feet |
|-------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| (1)                                                                                                               | Less than 5                                                                                                                                |
| 1/4 pound .....                                                                                                   | 6 - 10                                                                                                                                     |
| 1/5 pound per foot of distance .....                                                                              | 15 - 50                                                                                                                                    |
| 1/4 pound per foot of distance .....                                                                              | 60 - 200                                                                                                                                   |
| Over 50 .....                                                                                                     | (2)                                                                                                                                        |

Notes to Table

1. Total quantity of explosives shall not exceed  $\frac{1}{4}$  lb. per shot up to five feet from nearest building or structure.
2. Seismic control, to determine the ground constant, shall be required for more than 50 pounds of explosives.

## 10.5 FREQUENCY—AMPLITUDE RELATIONS

- 10.5.1 Blasting operations shall be so conducted that ground vibrations do not exceed the maximum amplitude of ground vibrations as related to frequencies of vibration set forth in Table 10.5.1.

Table 10.5.1  
Frequency — Amplitude Relations

| FREQUENCY OF<br>GROUND MOTION<br>Cycles per Second up to | MAXIMUM AMPLITUDE<br>OF GROUND MOTION<br>Inches not more than |
|----------------------------------------------------------|---------------------------------------------------------------|
| 10                                                       | 0.0305                                                        |
| 20                                                       | 0.0153                                                        |
| 30                                                       | 0.0102                                                        |
| 40                                                       | 0.0076                                                        |
| 50                                                       | 0.0061                                                        |
| 60                                                       | 0.0051                                                        |
| 70                                                       | 0.0043                                                        |
| 80                                                       | 0.0038                                                        |

## 10.6 ENERGY RATIO

10.6.1 Energy ratio shall be calculated by the following formula:

$$ER = (3.29 FA)^2$$

where F = frequency in cycles per second.

A = amplitude in inches.

Total ER is equal to the arithmetical sum of energy ratios in three mutually perpendicular planes of motion in the vertical and horizontal directions at any one instant of time.

10.6.2 The maximum total energy ratio shall not exceed 1.0 and all recordings shall be taken at the most critical location.

10.6.3 Where ground frequency and displacement characteristics have been determined by approved methods of instrumentation, ground transmission constants may then be determined by the formulae:

$$K = \left( \frac{D}{50C} \right)^2 ER \text{ and } K' = \left( \frac{D}{50C'} \right)^2 ER$$

where ER = maximum total energy ratio calculated from instrument recordings.

10.6.4 Maximum allowable explosive quantities used in relation to distances may then be determined by the formulae:

$$C = \frac{D}{50 \sqrt{K}} \text{ and } C' = \frac{D}{50 \sqrt{K'}}$$

where D = distance from blast in feet.

C = maximum number of pounds of explosives on any one delay period after the first period.

K = ground transmission constant based on C.

C' = number of pounds of explosives on the first period.

K' = ground transmission constant based on C'.

## 10.7 PARTICLE VELOCITY

10.7.1 Particle velocity shall be calculated by the following formula:

$$V = \frac{A}{t}$$

where V = particle velocity.

A = the amplitude in inches.

t = time in seconds.

Total peak particle velocity is equal to the vector sum of the particle velocities in three mutually perpendicular planes of motion in the vertical and horizontal directions at any one instant of time.

10.7.2 The maximum total peak particle velocity shall not exceed 1.92 and all recordings shall be taken at the most critical location.

10.7.3 Where peak particle velocity characteristics have been determined by approved methods of instrumentation, ground transmission constants may then be determined by the formulae:

$$K = \frac{VD}{C} \text{ and } K' = \frac{VD}{C'}$$

where V = maximum total peak velocity calculated or read directly from instrument recordings.

10.7.4 Maximum allowable explosives quantities used in relation to distance may then be determined by the formulae:

$$C = \frac{1.92 D}{K} \text{ and } C' = \frac{1.92 D}{K'}$$

where D = distance from blast in feet.

C = maximum number of pounds of explosives on any one delay period after the first period.

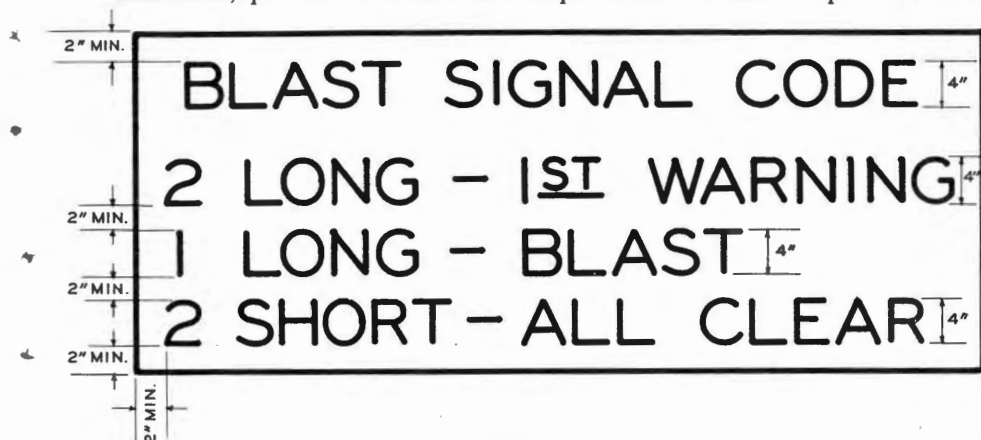
K = ground transmission constant based on C.

C' = number of pounds of explosives on the first period.

K' = ground transmission constant based on C'.

## APPENDIX A

Details of the material shown are general, and may be altered to suit the individual, provided the minimum requirements of this Chapter are met.



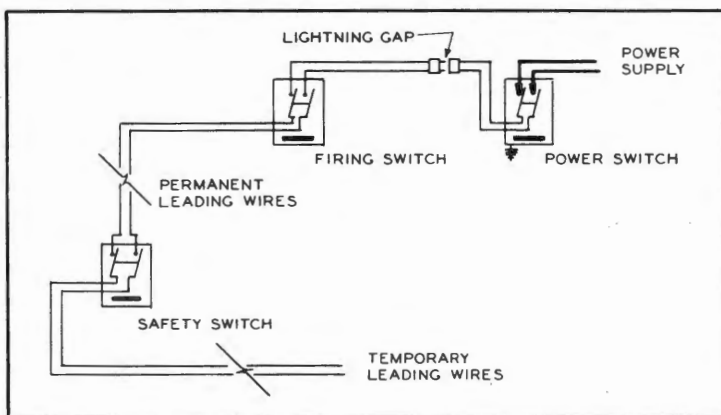


DIAGRAM FOR BLASTING WITH  
LIGHT OR POWER CIRCUIT