

STATE OF NEW JERSEY
DEPARTMENT OF LABOR & INDUSTRY
Percy A. Miller, Jr., *Commissioner*

RULES AND REGULATIONS

CONTENTS

MANUFACTURE, HANDLING AND STORAGE

of

MILITARY PYROTECHNICS

including Fireworks, Railway Signals and Fusees

Division of Labor
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Explosives Section
Trenton, New Jersey

Effective Date: April 4, 1951

1.1 SCOPE AND PURPOSE

1.1.1 The safety requirements set forth in these rules and regulations shall apply to every plant engaged in manufacturing, handling or storing military pyrotechnics.

1.1.2 The purpose of these rules and regulations is to provide for the safety and welfare of the employees of plants in which military pyrotechnics are manufactured and includes plants in which fireworks and railway signals and fuses are made.

1.1.3 Laws and rules and regulations governing the manufacture, storage, transportation, sale and use of explosives are applicable and shall be a part of these rules and regulations.

1.2 EXISTING PLANTS

1.2.1 Where existing plants are operating in a manner contrary to the provisions herein contained, modifications in the existing plant and any operations conducted therein may be ordered by the Commissioner when such modifications are necessary in his opinion to safeguard life and property.

1.3 EXPLOSIVES PERMITS

1.3.1 Permits must be obtained from the Commissioner for any operations involving explosives before any such operations begin.

1.3.2 Separate permits are issued for the manufacture, storage, sale, transportation or use of explosives and must be posted and kept posted as required by the explosives law.

1.4 APPROVAL OF PLANS AND OPERATIONS

1.4.1 Plans for all buildings on the plant as well as all plant operations must be approved before construction of any building commences or any such operations begin.

1.4.2 Neither physical changes in plant property nor changes in operating procedure may be made without prior approval.

1.4.3 Application for approval must be made on the form provided for that purpose and be accompanied by copies of plans in triplicate together with examining fee.

1.4.4 An approved copy of plot plan of plant layout is to be posted and kept posted in the main plant office.

1.4.5 A flow chart of the operations performed on the plant shall be currently maintained and be available for inspection by the Commissioner. The Commissioner may require that copies of the flow chart be furnished to him for approval.

1.5 There shall be compliance with the provisions of the rules and regulations for Industrial Plant Protection issued by the State Plant Protection Service.

1.6 ACCESS BY AUTHORIZED REPRESENTATIVES OF THE DEPARTMENT

1.6.1 The statutes prohibit any person from obstructing the Commissioner or any accredited and authorized representative of the Department in the performance of their duties which include the inspection of plants.

1.6.2 Suitable identification devices, similar to those in common use at the plant shall be prepared and kept available at the main entrance to the plant for the use of the Commissioner or his authorized representatives.

2. DEFINITIONS

For the application of these rules and regulations the following terms are defined:

2.1 "Military Pyrotechnics" shall be classified as follows:

2.1.1 Flare or illuminating

2.1.2 Signalling, including smoke

2.1.3 Tracer, and igniter

2.1.4 Incendiary ammunition; including projectiles, bombs, grenades

2.1.5 Photo-flash bombs

2.1.6 Desensitized metallic powder is a metallic powder that has been coated with an oil, wax or other substance in order to control its oxidation.

2.2 The term "plant" as used herein means and includes all land, with the factory buildings and other plant buildings incidental to or necessary for the continuance of operations situated thereon, used in connection with the manufacturing or processing of explosives or materials related to the manufacture of military pyrotechnics or in which any process involving explosives or such materials is carried on, or the storage of explosives or such materials thereat, as well as any premises where explosives or such materials are used as a component part or ingredient in the manufacture of any article or device.

2.3 The term "factory building" as used herein shall be held to mean any building or other structure containing explosives (excepting magazines and rest houses), in which the manufacture of explosives or any processing involving explosives is carried on or any building where explosives are used as a component part or ingredient in the manufacture of any article or device. Factory buildings shall include buildings used for the manufacture, processing, assembling, drying, handling and packing of military pyrotechnics.

2.4 The term "building" as used herein shall be held to mean and include only a building occupied in whole or in part as a habitation of human beings, or any church, schoolhouse, railroad station, bus station, store, factory, office or other building or structure where people are accustomed to assemble, except factory buildings or structures on explosives or pyrotechnic plants.

2.5 "Magazine" shall mean a building or structure used exclusively for the storage of explosives, such as black powder, loose oxidizing combustible mixture, and partially or completely loaded assemblies, except a factory building.

2.5.1 Magazines shall be classified as follows:

2.5.1.1 Powder magazines, for the main storage of black powder or similar explosives

2.5.1.2 Storage magazine; for the main storage of finished or rejected units, partially or completely loaded assemblies, etc.

2.5.1.3 Primer magazine; for the main storage of primers, percussion caps and fuse.

2.5.1.4 Portable storage magazines; for the storage of small quantities of Class 9 military pyrotechnic materials when such materials are being conveyed to service various operations requiring their use.

2.5.1.5 Rest houses; intermediate storage of Class 9 military pyrotechnics materials when the use or handling of such materials has become necessary to maintain production.

2.5.1.6 Service magazine; limited quantity storage of Class 9 military pyrotechnics to serve a factory building.

2.5.2 storage permits issued by the Bureau of Explosives of the Department of Labor and Industry must be posted in all magazines in the above classification excepting only magazines and rest houses containing Class 2 materials, powdered magnesium or flake aluminum.

2.6 The term "storehouse" as used herein means any building or structure, other than a factory building or magazine, used for the storage of Class 1 or Class 2 pyrotechnic materials.

2.7 The term "highway" as used herein shall be held to mean and include any public street, public alley, public road or navigable stream. Navigable stream shall be considered as only those streams capable of being used, in their ordinary condition or where improved by authorized agencies, as highways of commerce over which trade and travel are or may be conducted in the customary modes but shall not include streams that are not capable of navigation by barges, tugboats and other vessels.

2.8 The term "railroad or railway" whenever used herein shall be held to mean and include any steam, electric or other railroad which carries passengers for hire.

2.9 The term "public conveyance" whenever used herein shall be held to mean and include any vehicle which is carrying passengers for hire such as railroad car, street car, cab, bus, airplane or other vehicle.

2.10 The term "barricade" whenever used herein shall be held to mean a natural or artificial screen used for the purpose of protecting any factory or other building.

2.11 The term "quick-match" as used herein shall mean a fast-burning fuse positively and easily ignited, produced by impregnating cotton wicking with black meal powder.

2.12 "Approved" as used herein means approved by the Commissioner of Labor and Industry or his authorized representative.

2.13 "Commissioner" as used herein means the Commissioner of Labor and Industry.

2.14 "Effective date" as used herein means the date of filing of these rules and regulations in the office of Secretary of State.

2.15 "Existing" as used herein means existing before the effective date of these rules and regulations.

2.16 "Explosives law" when used herein means Chapter 27, Laws of 1941 and any amendments thereto.

2.17 For the purpose of these rules and regulations, the singular and the plural are interchangeable.

3. EXPLOSIVES CLASSIFICATION

3.1 For the purpose of these rules and regulations, military pyrotechnics material shall be included in the components, assemblies or completed unit and be classified as follows:

3.1.1 Class 1

3.1.1.1 Tracer or incendiary ammunition for small arms when assembled in the complete round.

3.1.2 Class 2

3.1.2.1 Metallic powder when not in closed approved containers.

3.1.2.2 Desensitized metallic powder.

3.1.2.3 Thermate and other similar incendiary compositions including burning type first fire mixtures.

3.1.3 Class 2A

3.1.3.1 Metallic powder when in closed approved containers.

3.1.3.2 Inorganic chlorates, perchlorates or peroxides in closed approved containers.

3.1.3.3 Illuminating, flare, incendiary, signal or smoke compositions which have been consolidated in the final press operations and are so enclosed that no explosive material is exposed.

3.1.3.4 Military pyrotechnics that have been boxed and are ready for shipment.

3.1.4 Class 9

3.1.4.1 Illuminating, photoflash, flare, tracer, incendiary, explosive first fire, signal or smoke compositions up to and including final pressing or consolidation and including loose pelleted material,

3.1.4.2 Rejected units or compositions.

3.1.4.3 Flashlight powder

3.1.4.4 Photoflash bombs

3.1.4.5 Black powder

3.1.4.6 Quick match

3.1.4.7 Primers and percussion caps

3.1.5 Other unclassified material shall be classified by the Commissioner.

4. LOCATION OF PLANT AND BUILDINGS

4.1 LOCATION AND SPACING

4.1.1 Plants shall be located in sparsely settled sections where sufficient space is available to provide for compliance with specified quantity-distance relations for all plant buildings and magazines.

4.1.2 The plant layout shall provide for segregation of operations according to degree of hazard and buildings in any one such group shall be separated from those in any other group in accordance with the quantity-distance relations provided in these rules and regulations.

4.2 QUANTITY - DISTANCE RELATIONS

4.2.1 Quantity-distance relations and other safety requirements prescribed in these rules and regulations are based on the explosive hazard inherent in processing, assembling, storing and shipping military pyrotechnics.

4.2.2 Factory buildings and magazines shall be spaced in accordance with the quantity-distance tables appended hereto in the manner specified below.

4.2.2.1 Class 1 materials - no limitations.

4.2.2.2 Class 2 materials - use table A to determine the spacing of factory buildings and magazines from other factory buildings and magazines in the plant and all other buildings not on plant property together with any railway or highway.

4.2.2.3 Class 2A materials - use table B in a manner similar to 4.2.2.2.

4.2.2.4 For Class 9 materials - use intraplant table C to determine the spacing of factory buildings and magazines from all factory buildings and any magazines in the plant.

4.2.2.5 For Class 9 materials - use table D to determine the spacing of factory buildings and magazines from all other buildings not on plant property together with any railway or highway.

4.3 ROADS

4.3.1 The road system serving magazines, storage buildings, service buildings, or operating buildings shall be so arranged that vehicles carrying pyrotechnic materials shall not, in the event of fire or explosion, be isolated on dead end roads. Roads shall be well graded and maintained in good condition.

4.4 FENCING

4.4.1 The entire property shall be surrounded with a high strong nonclimbable fence, designed to prevent unauthorized access to the plant and having a minimum height of eight feet.

4.4.2 Emergency fence egress equipped with panic bars properly protected, must be provided at least on each side of the fence line and at as many more locations as may be required to provide for the safety of the operatives.

4.5 ENTRANCES

4.5.1 The gates or entrances to the property shall be guarded in an approved manner.

4.6 TEST AREA

4.6.1 Where pyrotechnic materials are to be tested upon the plant premises a suitable test area, free from all combustible materials shall be provided.

4.6.2 Such test area shall be located at a distance of at least five hundred (500) feet from any building not on plant property, railway or highway and two hundred (200) feet from any factory building. No magazine shall be less than three hundred (300) feet from a test area but in no case less than the distance required in table C for factory buildings.

4.6.3 Visible signals such as red flags shall be provided so as to identify and effectively restrict the testing area.

4.6.4 The methods of testing pyrotechnics materials shall be such as to provide adequate protection to the testing personnel and shall otherwise be subject to the approval of the Commissioner.

5. CONSTRUCTION

5.1 GENERAL TYPE OF CONSTRUCTION OF FACTORY BUILDINGS.

5.1.1 Fire resistance. All factory buildings shall be constructed of fire retardant materials and fittings.

5.1.2 Height limitations. Factory buildings shall be constructed without basement and shall be limited to one story in height excepting that a mezzanine or platform used exclusively as an area for servicing or operating equipment at intervals shall be permitted.

5.1.3 Walls. Exterior and division walls shall project to at least 24 inches above the roof.

5.1.4 Roof. The roof shall be lightly constructed to provide for effective venting of suddenly developed internal pressure. The roof shall be constructed and at all times maintained in a weathertight condition.

5.1.5 Floors. Floors of all factory buildings where an explosive or flammable condition may exist shall be surfaced with an approved non-sparking conductive material effectively connected to ground. It is desirable to extend this material to a height of 6 inches above the floor and provide a fillet at the floor line and a ledgeless junction at the wall.

5.1.6 Doors

5.1.6.1 Fire doors shall be of an approved type.

5.1.6.2 All doors shall be not less than 40 inches wide and shall swing outwardly. Any protective locking device shall be manually operated.

5.1.7 Windows and sky-lights

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5.1.7.1 Windows shall be glazed with non-shattering material and shall be of the explosion venting type with catches designed to release on the application of pressure from within.

5.1.7.2 Window openings not in the same plane shall not be less than 25 feet apart.

5.1.7.3 Where installed, sky-lights shall be glazed with non-shattering material.

5.1.8 Explosion venting area

5.1.8.1 One square foot of venting area shall be provided to every thirty-five cubic feet of room volume.

5.1.8.2 The venting area may comprise explosion type venting windows, skylights with suitable release catches and doors which are not self-locking.

5.1.9 Interior finish of walls and ceilings

5.1.9.1 Interior walls and ceilings of factory buildings shall be of smooth finish preferably painted with a gloss paint to prevent accumulation of dust and to facilitate good housekeeping. Horizontal ledges which hold dust shall be avoided.

5.1.10 Exits

5.1.10.1 At least 2 exits shall be provided in each factory building or operating room, the minimum width of door to be 40 inches. The door shall be of fire proof material and shall open outwardly.

5.1.10.2 Deviation from any of the provisions of this section may be permitted in press houses if such provisions are found to be impracticable by the Commissioner, in which case safety to occupants must be assured. In no case shall the distance of travel from any point on the floor exceed twenty-five feet to the nearest exit.

5.1.10.3 In rooms of factory buildings containing Class 9 materials in which more than 4 persons are employed, approved exit doors not less than 40 inches wide shall be provided and spaced not to exceed 25 feet center to center between doors along each wall of the room or building.

5.1.10.4 In rooms of factory buildings containing other than Class 9 materials, one approved exit door shall be provided at an approved location for every eight additional occupants.

5.1.10.5 Two-leaf spring operated swing doors without self-locking hardware shall be provided in factory buildings. All doors shall be of fire proof material and shall open outwardly.

5.1.10.6 Every exit from a factory building shall be an exit to outer air excepting that where a factory building is divided into work rooms served by vestibules or corridors not exceeding 20 feet in width, the door affording egress from the work rooms shall constitute an acceptable horizontal egress provided they are so approved and in addition that opposite such door there is located an exit to outer air from the vestibule or corridor.

5.1.10.7 Exits to outer air shall be not more than one riser or not more than 8 inches from ground level. If the distance to ground level exceeds 8 inches, a ramp at least 36 inches wide and with substantial handrails shall be provided. The slope of the ramp in direction of travel shall not exceed ten per cent and the ramp shall extend for a minimum distance of 10 feet perpendicular to the wall of the building.

5.1.11 Mezzanines and working platforms

5.1.11.1 Mezzanines and working platforms shall be provided with approved exits to outer air, excepting that working platforms not more than four feet above the main floor level, used only as a place of occasional employment shall only require stairs to said floor level.

5.1.12 Electric wiring and equipment

5.1.12.1 Electric wiring and equipment (including lights) should preferably be installed outside of buildings where aluminum powder, magnesium powder, or explosives dust may be present; where necessary to install inside of building then they should be in accordance with the requirements of Class 2 locations (Group E atmospheres containing metal dust Article 500 of the current edition of the National Electrical Code and subsequent revision thereof.)

5.1.12.2 Provisions shall be made for remote control of the electrical circuits so that the light and power in any building where a hazardous operation is performed can be cut off by switches outside of the building at least four feet from the nearest doorway.

5.1.12.3 It shall be arranged so that the power of the *entire plant* can be cut off by switches located at one or more of the central points, such as at the office, watchman's booth or power house.

5.1.12.4 All electrical equipment shall be inspected at least every six months and cleaned periodically.

5.1.12.5 Where flashlights or storage battery lamps are used, they shall be of a type approved by the U. S. Bureau of Mines as permissible or as permitted by the National Electrical Code.

5.1.12.6 In all hazardous locations, floors and benches shall be covered with non-sparking, smooth conductive material, connected to effective ground.

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5.1.13 Heating

5.1.13.1 The source of heat generation of an operating building containing Class 9 pyrotechnic materials shall be located in a separate structure, physically separated from the operating building in accordance with the intraplant distance table as provided herein.

5.1.13.2 The source of heat generation for an operating building containing Class 1 or Class 2 pyrotechnic materials shall be separated from the remaining part of the factory building by a fire wall without openings. The area thus separated for heating purposes shall not constitute a work room. If forced or warm air is used to heat such an operating building through a separating wall pierced by hot air ducts, such openings shall be provided by automatic fire doors on both sides of the fire walls. Recirculation of air from operating buildings back to the heater shall not be permitted. Where the heated air is forced through metal ducts, such ducts shall be electrically grounded.

5.1.13.3 Gas fired unit heaters or unit heaters with exposed electrical elements shall not be installed in any factory building containing pyrotechnic materials. The installation of unit heaters of any other type shall be confined to operating buildings containing Class 1 or Class 2 pyrotechnic materials.

5.1.13.4 Ferrous radiators shall be protected by location or by non-ferrous guards in such a manner that they cannot be struck by any object which may create metallic sparks. All heating units or radiators shall be so constructed and installed that there are no ledges, crevices or voids which cannot readily be cleaned without the use of special tools or equipment.

5.1.13.5 The heating units or radiators in an operating building shall be so controlled that in no case shall the temperature of the heating units exceed 228°F. Such temperature shall not be controlled by electrical devices within the operating building.

5.1.13.6 Chimneys and stacks located within the plant area shall be provided with metal screen spark arrestors.

5.1.14 Ventilation

5.1.14.1 Natural or mechanical ventilation shall be provided in all factory buildings or workrooms in a sufficient amount to prevent the accumulation or concentration of dusts, gases or vapors which may be explosive or injurious to health. Plans for mechanical systems must be approved before being installed.

5.1.14.2 Where aluminum or magnesium dust is generated in dangerous quantities, such dust shall be removed by mechanical ventilating systems so designed as to impinge the dust laden air against a suitable curtain of paraffin oil or similar viscous substance.

5.1.14.3 A mechanical ventilating system shall be required for all operations wherein flake aluminum is used.

5.1.14.4 Exhaust fans shall be equipped with non-ferrous blades and explosion-proof motors. The entire mechanical ventilating system shall be bonded by an electrical conductor and grounded in an approved manner.

5.1.15 Sprinkler System

5.1.15.1 Approved automatic sprinkler systems shall be installed wherever suitable, considering the type of fire to be extinguished, and where not prohibited elsewhere herein.

5.1.15.2 Sprinkler systems shall not be installed where water will increase the fire hazard, such as in rooms used for blending and pressing operations.

5.1.16 Security of hardware

5.1.16.1 All nuts and bolts shall be bonded or have threads burred. All unnecessary nails shall be removed. All unnecessary hardware shall be eliminated.

5.1.17 Passageways

5.1.17.1 Covered passageways with sloping roof enclosed on the low side only may be provided between buildings or alongside the rooms or compartments housing individual machines. Entrances to rooms shall be at right angles to the direction of travel through the passageway and all connections to the passageway shall be protected by approved self-closing swinging fire doors. An opening from one room to the passageway shall not be directly opposite the opening from another room to the passageway. Each such passageway shall be provided with a masonry fire barrier near the midpoint between buildings.

5.1.18 Lighting Protection

5.1.18.1 A lightning conductor system for the protection of all factory buildings shall be provided. Such system shall be of a sufficient size and capacity to protect fully all buildings in the area from lightning.

5.1.19.1 Motivation of equipment by belting from drive shafts shall be exterior to operating buildings, and belts shall preferably be dressed with electrically conductive material. Power transmission equipment shall be grounded.

5.1.20 Spraying

5.1.20.1 All spraying operations involving enamel, lacquer, and the use of flammable thinning agents shall be segregated. Such spraying operations shall be conducted in approved ventilated non-combustible booths or enclosures.

5.1.21 Static Electricity

5.1.21.1 Wherever possible, the formation of charges of static electricity shall be controlled by maintaining the humidity between 50% and 55% in working areas where materials subject to static electricity ignition are handled.

5.1.21.2 In such areas, all equipment shall be connected to effective ground in an approved manner.

5.2 SPECIAL CONSTRUCTION IN CERTAIN OPERATIONS

5.2.1 Storage

5.2.1.1 Raw materials shall be grouped according to the following classifications:

- 5.2.1.1.1 *Explosives, including black powder*
- 5.2.1.1.2 *Metallic powder*
- 5.2.1.1.3 *Oxidizing agents*
- 5.2.1.1.4 *Combustible materials*
- 5.2.1.1.5 *Paints, oils and lacquers*
- 5.2.1.1.6 *General storage*

5.2.1.2 Each of the above groups shall be stored in a separate area confined by parapeted fire walls excepting that explosives must be stored in approved magazines suitably separated from other buildings.

5.2.1.3 Magazines

5.2.1.3.1 Magazines shall be dry, well-ventilated and of approved construction.

5.2.1.3.2 Magazines shall be unheated, with the exception of magazines used solely for the storage of magnesium powder, aluminum powder or cordite and in the case of service magazines where heating may be necessary to prevent condensation of moisture when material, other than an explosive, is to be taken into a factory building. Where magazine heating is permissible, steam coils shall be so arranged that pyrotechnic material will not come in contact with the heating coils.

5.2.1.3.3 Magazines excepting those used solely for the storage shall not be provided with interior illumination, provided that only approved portable safety battery lamps may be used.

5.2.1.3.4 All magazines shall be kept locked except when necessarily opened for the purpose of taking in or removing materials therein or for inspection or repair by persons duly authorized.

5.2.1.4 Barricades

5.2.1.4.1 A barricade shall be not less than four feet from the building to be screened and if artificial, shall be constructed separately from the building except as provided in section 5.2.1.4.8.

5.2.1.4.2 An artificial barricade shall consist of sand or earth from which all stones larger than 2 inches in largest dimension have been removed. The top of such a barricade shall have a minimum width of not less than 3 feet. One or both sides of an artificial barricade shall be constructed in an approved manner as a revetment with side slope not greater than 2:1; or the fill retained by concrete, timber or masonry walls. Artificial barricades may be constructed of reinforced concrete capable of withstanding a blast pressure of 90 lbs. per square inch in any direction.

5.2.1.4.3 All fire barricades in an approved location shall consist of a masonry wall at least twelve inches thick.

5.2.1.4.4 Any building, factory building or magazine shall be considered to be "effectively barricaded" if any straight line drawn from the top of any side wall of the factory building or magazine to any part of a magazine, plant building or building to be protected will pass through the barricade. A railroad or highway is considered to be effectively barricaded if any straight line drawn from the top of any side wall of a magazine or factory building to any point twelve feet above the center of the railroad or highway will pass through the barricade. When an effective barricade is available, the distances in table B and C may be reduced one-half.

5.2.1.4.5 Barricades are authorized for use in reducing both intraplant distances and structural damage distances for all materials except Class 2 materials, but not for reducing missile distances. The applicable distance (except missile and Class 2 and 2A explosives distances) as prescribed by the quantity and distance table D and the intraplant quantity and distance table C, may be reduced one-half.

5.2.1.4.6 Approved reinforced concrete, arch type, earth filled (igloo) magazines are considered barricaded with respect to missiles. Other types of igloo magazines are not considered barricaded in any respect unless separate barricades are provided.

In order for a barricade to be used for the purpose of reducing safety distances it shall be constructed as a separate structure from the building it is to screen and shall be located not closer than four feet from such building.

Artificial barricades may be constructed of reinforced concrete or consist of earth fill containing no particles larger than two inches in their longest dimension.

5.2.1.4.7 Locations containing less than 100 lbs. of Class 9 explosives may be barricaded by a reinforced concrete wall with a minimum thickness of twelve inches. For 100 lbs. or more of Class 9 material, an earth or sand filled barricade shall be used, with a minimum width of three feet at the top. Either one or both sides may be revetted or supported by concrete, timber or masonry walls.

5.2.1.4.8 For operating equipment, an effective barricade may be constructed of steel plate, or other approved material, of an approved thickness, not less than $\frac{1}{2}$ " steel plate or its equivalent. A vision panel shall be provided consisting of $\frac{3}{4}$ " laminated safety glass with a maximum size of 6" by 8".

5.2.1.5 Black Powder

5.2.1.5.1 Main storage area shall be limited by quantity and distance relation table C.

5.2.1.5.2 No building shall be constructed near the area unless specifically approved.

5.2.1.5.3 Valid permits shall be posted and kept posted in all types of magazines.

5.2.1.5.4 Area adjacent to main black powder storage magazines to be ploughed and kept plowed for a distance of 50 feet from any point of the magazine or barricade.

5.2.1.6 "Fire wall": An approved fire wall as referred to herein is a substantial brick, reinforced concrete, hollow tile or concrete block wall designed to prevent transmission of fire from one side to the other under severe conditions of the complete destruction by fire of the contents on either side. The minimum requirements will be those of a wall with a fire resistive rating of four hours. In buildings of masonry construction the fire wall will extend through and not less than 24 inches above combustible roof construction. Fire walls in buildings of frame or light incombustible construction should extend through both side walls and roof for not less than 36 inches. All openings in "fire walls" should be protected with approved automatic fire doors.

5.2.1.7 A "substantial dividing wall" shall be constructed of concrete not less than 12 inches thick, reinforced on both faces with rods at least $\frac{1}{2}$ inch in diameter, spaced not more than 12 inches on center horizontal and vertically. The rods on one face are to be staggered with respect to rods on the opposite face. A substantial dividing wall shall extend to the roof and to the side walls of the building or room which it divides into separate rooms.

The subdivision of large amounts of explosive material into a number of smaller amounts divided by substantial dividing walls, is intended to prevent the en masse explosion of the total quantity of explosives involved. If all of the explosives on both sides of a substantial dividing wall are prevented from exploding en masse, the purpose for which the wall was provided has been accomplished, even though the wall may be demolished and structural damage in the plant may be severe.

5.2.2 Manufacture

5.2.2.1 Operations of a different type must be performed in separate buildings, in general conformance with the following: drying, screening and weighing, weighing, grinding, coating, blending, loading and pressing, matching and igniter assembly, final assembly and packing, repairing and reassembling defective loaded components.

5.2.2.2 Drying of ingredients (other than magnesium powder)

5.2.2.2.1 Heat shall be applied by the indirect method whereby the air is blown over the radiators and circulates through the mass of material to be dried. Fans or blowers shall not be located within the dry-house.

5.2.2.2.2 The temperature shall not exceed 120° F. at any point in the dryer apparatus or drying room, excepting where a lower temperature is herein specified.

5.2.2.2.3 Recording thermometers shall be used where hazardous materials are dried and shall actuate an alarm when excessive temperatures develop.

5.2.2.2.4 Trays upon which material is spread for drying shall be of non-ferrous metal and shall be effectively grounded. Prier frames shall preferably be of non-ferrous metal, effectively grounded.

5.2.2.3 Screening and Weighing

5.2.2.3.1 All power-driven screening equipment shall be equipped with dust-tight non-ferrous enclosures for the purpose of minimizing the escape of dust from such equipment; and effectively grounded.

5.2.2.3.2 Rooms in which screening operations are performed shall have all inside surfaces as smooth as possible. The building construction shall be such that no opportunity is given for accumulation of dust.

5.2.2.3.3 Floors and bench tops shall be covered with non-sparking, smooth, conductive material connected to effective ground.

5.2.2.4 Weighing

5.2.2.4.1 Separate weigh houses shall be provided for the following four classes of materials: black powder, metallic powders, oxidizing agents, other ingredients.

5.2.2.4.2 Upon approval, weighing operations may be conducted in a separate room of a building in which operations requiring said weighing are conducted.

5.2.2.4.3 The floor and all work benches in the weigh room shall be covered with a conductive, non-sparking material.

5.2.2.5 Grinding

5.2.2.5.1 Where inorganic chlorates, perchlorates or peroxides are ground in a hammer mill, the building shall be barricaded and mill operated by remote control.

5.2.2.5.2 Grinding equipment shall have all metal parts electrically bonded, and the entire equipment shall be connected with the ground by a low resistant dust-tight metallic connection.

5.2.2.6 Coating of magnesium powder with linseed oil

5.2.2.6.1 The mechanical blender used for mixing the magnesium powder and linseed oil shall be electrically grounded.

5.2.2.6.2 If carbon tetrachloride is used as a solvent for the linseed oil, provisions shall be made to remove the carbon tetrachloride fumes by means of an approved type of ventilating hood.

5.2.2.6.3 Dry houses shall be located as provided in quantity and distance tables. Two units of 5 sections each may be provided spaced as provided in the quantity and distance table. A fire-proof barrier shall be constructed between the units. Each section shall have a drying capacity not to exceed 500 lbs. Location of all buildings herein contained shall be otherwise governed by the quantity distance tables.

5.2.2.6.4 Mechanically operated screens used for the purpose of sieving the coated magnesium shall be electrically grounded.

5.2.2.7 Blending

5.2.2.7.1 Blending operations shall be conducted in a separate building. Not more than 2 blenders or blending operations may be located in one building; each blender or blending operation shall be performed in a separate working room. All walls shall be constructed of reinforced concrete at least 12 inches thick except that one outside wall or a panel therein shall be of approved light construction. The separating wall shall extend through the roof and beyond each light building wall for a distance of 3 ft. The roof shall be of light panel type construction to provide for quick release due to internal pressure.

5.2.2.7.2 Blending or mixing machines shall not utilize power driven mixing elements such as blades.

5.2.2.7.3 A blender or mixing machine such as burnishing barrel (capable of being elevated, depressed, and emptied from behind barricade) shall be used.

5.2.2.7.4 If blenders are equipped with baffles, they shall be securely welded in position.

5.2.2.7.5 Bronze balls shall not be used in blenders which are equipped with baffles; where permitted, bronze balls shall not be larger than 1 inch in diameter.

5.2.2.7.6 The power to actuate the blender shall be applied by shafting extending through the wall and connected through a reduction gear to a motor located outside the room.

5.2.2.7.7 The blenders shall be effectively grounded.

5.2.2.7.8 Covers for blenders shall be provided with a safety seal or disc for the purpose of relieving any gaseous pressures developed from within.

5.2.2.8 Loading and Pressing

5.2.2.8.1 Each individual press or loading operation shall be located in a separate room or building. The wall of the room or building shall be constructed of reinforced concrete approximately 12 inches thick and operator shall be protected from injury during operations by an efficient barricade. Building exits shall be installed directly to rear of operators normal working position. All motivating equipment, such as hydraulic pumps, motors and electric switches shall be exterior to the press room. At least one wall or equivalent panel areas in more than one wall shall be of light or weak construction. Openings not to exceed 6 inches in least dimensions nor more than one square foot may be permitted in separating walls if approved fire stops are provided on both sides of walls. Sequence type interlocks shall be provided on such fire stops where occupancy is prohibited during operations.

5.2.2.8.2 When pelleting or pressing operations are carried out in bays, such bays shall be constructed of reinforced concrete approximately 12 inches in thickness, parapeted to at least 24 inches above the roof with the roof over each bay independently supported and of free-lift type. Bays may be poured singly or in pairs.

5.2.2.8.3 The loading and pressing of the composition shall be done in a separate approved unit. Presses in which composition containing black powder is used shall be located in an individual compartment of approved design.

5.2.2.8.4 The press shall be effectively grounded.

5.2.2.8.5 The pressing operation shall be conducted on single unit presses and from behind an effective barricade. Non-ferrous press rams shall preferably be used.

5.2.2.9 Matching and Igniter Assembly

5.2.2.9.1 Matching and igniter assembly shall be done in a building used only for the purpose. The building may be sub-divided into protective compartments.

5.2.2.10 Final Assembly and Packing

5.2.2.10.1 Final assembly operations include all operations from matching and igniter assembly to finished article.

5.2.2.10.2 Such assembly operations shall be removed from pressing and blending operations by distances in accordance with tables herein.

6. OPERATIONS

6.1 STORAGE

6.1.1 A service magazine shall be maintained in an approved location to supply ingredients for explosive first fire mix house.

6.1.2 Approved portable magazines are to be provided to convey the black powder from main storage magazine to service magazine and from service to the mix house.

6.1.3 Black powder is to be dispensed only from approved container in the assembly room.

6.1.4 Loaded assemblies shall not be stored in operating buildings.

6.1.5 Oxidizing combustible mixtures in the unpressed state shall not be stored in buildings used for the storage of completed assemblies.

6.1.6 In the layout of plants each operating line, storage area and administration area shall constitute a separate group of buildings or facilities so located that any such group is separated from all other groups by "inhabited building distances", if hazardous materials are involved. (See tables A, B and C attached.)

6.2 MANUFACTURE

6.2.1 Dust formation shall be kept at a minimum

6.2.2 Screening and weighing

6.2.2.1 All dry compound shall be separately screened using a 20 mesh screen to remove lumps and foreign matter. When used, a hand screen shall be protected with a hopper and hood to prevent the spread of dust and the breathing of dust by the operator. Screens shall be connected to effective ground.

6.2.2.2 After screening, the metal shall be placed immediately into approved covered containers, preferably made of conductive, non-sparking material.

6.2.2.3 The screen room which may be part of the weighing room shall be ventilated and kept clean at all times.

6.2.2.4 All power-driven screening equipment shall be equipped with dust-tight non-ferrous enclosures for the purpose of minimizing the escape of dust from such equipment.

6.2.2.5 Only non-ferrous tools shall be used.

6.2.2.6 Good housekeeping is important. Continuous housekeeping routine shall be maintained.

6.2.3 Weighing

6.2.3.1 Weighing shall be done on scales connected to an effective ground by a grounding cable having a current carrying capacity not less than #8 wire.

6.2.3.2 Weighing room shall be suitably ventilated and shall be kept free from dust and be cleaned at least once every 24 hours.

6.2.4 Grinding

6.2.4.1 Ingredients shall be run over an approved magnetic separator before grinding.

6.2.4.2 Barium nitrate and similar crystalline materials when consolidated in lump by storage may be pulverized by pressing under a roller, or by grinding in a hammer mill or in a rotating drum containing bronze balls.

6.2.4.3 Ground material will be screened carefully after grinding and preferably run over a magnetic separator.

6.2.5 Coating of magnesium powder with linseed oil

6.2.5.1 When magnesium powder is used as an ingredient of flare, signal and coating with linseed oil for the purpose of insulating the magnesium against moisture and against the chemicals which may be pressed in contact with it. The process may present a toxic hazard if carbon tetrachloride is used as a solvent for the linseed oil, and may present a fire hazard if the oxidation rate of the linseed oil is not controlled.

6.2.5.2 Coated magnesium powder shall be dried in a dry house to control the oxidation rate if linseed oil is used. The coated powder shall be spread to a 2" depth in non-ferrous metal trays having a non-ferrous, wire woven screen bottom. The trays shall fit into grounded metal racks. The temperature in the dry room shall not exceed 75° F. and the room shall be well ventilated. The humidity in the dry room shall be between 50% and 60%.

6.2.5.3 Maximum quantity to be desensitized at any one time in one operation shall not exceed 100 lbs.

6.2.6 Blending

6.2.6.1 Pre-blending by hand sieving shall be limited to nitrates, sulfur and oil ingredients, for the sole purpose of desensitizing the oxidizing agents and reducing the formation of explosive dust.

6.2.6.2 Strong oxidizing agents, such as inorganic peroxides, chlorates, and perchlorates shall be desensitized with oil (where oil is a part of the general formula) prior to blending with combustible materials.

6.2.6.3 Pre-blended oxidizing ingredients shall be blended with metallic substances in a mechanical blender.

6.2.6.4 Maximum allowable quantities of composition per charge as specified herein for safe operation of blenders are not to be exceeded.

6.2.6.5 While the blender is in operation, no person shall be allowed in the building.

6.2.6.6 Operation rules shall be strictly enforced. These rules shall provide for:

6.2.6.6.1 remote control from behind barricade.

6.2.6.6.2 prohibition of any person from danger areas when blenders are in operation.

6.2.6.6.3 marking of danger areas by warning lights while blenders are in operation.

6.2.6.7 The blender shall be emptied from behind a barricade.

6.2.6.8 When more than one type of mixture is processed in a blender, the equipment shall be thoroughly cleaned before the blender is charged with a different mixture.

6.2.7 Loading and pressing

6.2.7.1 Non-ferrous tools shall be used in the press room.

6.2.7.2 Good housekeeping shall be maintained in the press room. The walls, ceilings, horizontal ledges, and beams shall be cleaned at least once per shift.

6.2.7.3 All extraneous compositions shall be removed from the press and other equipment upon the completion of each cycle of operation, and the press shall be thoroughly cleaned once every two hours.

6.2.7.4 The use of multiple presses shall be prohibited.

6.2.8.1 Such assembly operations shall be adequately spaced one from the other to prevent congestion of employees in case of fire.

6.2.8.2 Benches shall be placed with ends toward the exits in order that easy egress may be had in case of fire.

6.2.8.3 Components in the process of being assembled shall not be allowed to accumulate in aisles or in front of exits.

6.2.8.4 Packing of finished articles shall be done in a sub-divided portion of the assembly building.

6.2.8.5 Packed articles shall be removed to finished storage magazines immediately.

6.2.8.6 Packed articles shall be handled carefully at all times.

6.2.9 Defective loaded components

6.2.9.1 Defective loaded components shall be removed immediately from a factory building and set aside for the purpose of reclaiming but only when such operations have been approved by the Commissioner. Such buildings shall be located in accordance with the distance tables given herein. Reclaiming of pressed and final consolidated compositions shall be provided.

6.2.9.2 Exits and aisles in buildings used for repair of loaded components shall be located and arranged according to the quantity of material being processed and the number of employees in the building. Wide, unobstructed means of egress shall be provided.

6.2.9.3 In order to reduce the quantities of waste pyrotechnic materials in operating buildings to a minimum, small covered waste containers shall be provided at necessary points in the operating building for collection, and such small containers shall be used at regular and frequent intervals to transport the waste material to the platform containers.

6.2.9.4 Where the waste material consists of black powder, the container shall be so arranged that the waste powder falls into water. Otherwise waste pyrotechnic materials shall be kept dry and placed in absolutely dry containers. The containers shall be distinguished as (I) inert material and (II) flammable or explosive material. Containers for these pyrotechnic materials shall be distinguished by color designation and shall be properly labeled. Platform containers shall be placed on a platform at a distance of at least 50 feet from any operating building. At the end of each working shift, waste material in these containers shall be removed to a disposal area and destroyed under proper supervision.

6.2.9.5 A burning dump or disposal area shall be established in a safe and remote location to be used exclusively for the destruction of waste or rejected pyrotechnic material or components.

6.2.10 Waste Disposal

6.2.10.1 Waste materials shall be removed at frequent intervals from operating area.

6.2.10.2 Waste materials shall be collected in containers and distinguished as (I) inert material and (II) flammable or explosive material. Containers for these materials shall be distinguished by a difference in color and shall be labelled properly. These containers shall be placed on a platform at a distance of at least 50 feet from operating buildings. At the end of each working shift, waste materials in those containers shall be removed to a disposal area and destroyed under proper supervision.

6.2.10.3 Under no condition shall waste composition be collected and stored for later manufacture into commercial pyrotechnics by the contractor.

7. SAFETY REQUIREMENTS

7.1 GENERAL SAFETY PRECAUTIONS, DISCIPLINE AND GOODHOUSEKEEPING

7.1.1 A labor-management safety committee shall be organized and shall consist of one representative each from management, supervision and labor. Each foreman shall be responsible for safety on his respective line. Regular frequent meetings shall be held with the plant superintendent acting as chairman. The safety program should include frequent accident prevention inspections made by the members of the committee, and records of such inspections retained on file. These inspections should cover general safety precautions, adequacy, and condition of fire fighting, electrical, and mechanical equipment, as well as good housekeeping, first aid, guards, etc.

7.1.2 Strict discipline and good housekeeping are essential at all times. To this end, continuous cleaning shall be carried out as frequently as local conditions require for maintaining safety. In any case, cleaning shall be done at least twice a week, except as otherwise specified, but shall never be done at the time that operations are in progress.

7.1.3 A thorough systematic inspection shall be made daily by at least one competent employee, and the records of such inspection shall be entered in a book retained at the office of the plant which book shall be available for inspection by an authorized representative of the Commissioner. This inspection shall cover safety precaution, operating procedures, fire fighting equipment, electrical and mechanical equipment, as well as good housekeeping and first aid, guards, etc.

7.2 PROTECTIVE CLOTHING FOR WORKERS

7.2.1 All operators employed in the specified hazardous operations shall be provided with uniforms of tightly woven, smooth fabrics treated with fire resistive chemicals. Wool garments are not permitted. Fasteners shall be non-metallic. This clothing shall be made with skeleton pockets, and shall be easily removable. Trousers or slacks shall be without cuffs. All protective clothing must be laundered daily. Female workers shall not wear silk or rayon underclothing. All operators employed in weighing or screening, blending, loading and pressing and operations involving black powder must wear powder safety shoes, which shall be inspected and kept free from foreign material. Shoes that are not in proper condition shall not be worn. All other uniforms shall be laundered at least twice weekly, and flame-proofed after each laundering.

7.3 CHANGE HOUSE

7.3.1 A change house shall be provided near the entrance to the plant to permit all employees to change from street clothes to approved uniforms and powder shoes. Resistance tests shall be made of employees passing through the change house where such tests are ordered by the Commissioner.

7.3.2 All employees shall be inspected for compliance with these requirements before leaving the change house to enter the plant working area.

7.4 Maximum allowable quantities of composition and ingredients. The following maximum allowable quantities of composition and ingredients that are permitted in a workroom at any one time shall not be exceeded under any circumstances for the specified operations.

7.4.1 weighing, blending, coating and drying:

7.4.1.1 Igniter composition for tracer	10 lbs.
7.4.1.2 First fire compositions	25 lbs.
7.4.1.3 Tracer compositions	25 lbs.
7.4.1.4 Signaling compositions	25 lbs.
7.4.1.5 Flare and incendiary compositions	100 lbs.
7.4.1.6 Magnesium powder coating	100 lbs.
7.4.1.7 Coated magnesium powder drying	500 lbs.
7.4.1.8 Thermate - per dry house unit	200 lbs.

7.4.2 Pressing and loading

7.4.2.1 Igniter and first-fire composition 10 lbs.

7.4.2.2 Tracer, signaling, flare and incendiary composition (exception-thermate) not to exceed that required for units undergoing the pressing operation. (The above compositions shall be kept in approved closed containers.)

7.4.2.3 No units in excess of a total of 30 lbs. of pressed composition excepting that for pressed first-fire composition the units shall not exceed 4 units.

7.4.2.4 The quantity of composition to be consolidated by a single operation of the press shall not exceed one quarter of a pound except where a larger quantity has been specifically approved.

7.4.3 Matching - not more than 20 units.

7.4.4 Final assembly - not more than 20 units awaiting final assembly.
not more than 60 units undergoing final assembly operation.
not more than 100 units in final packing operations.

NOTE: In no case, may the quantity of composition in any area exceed that established by the quantity and distance tables.

7.5 MAXIMUM ALLOWABLE OPERATORS AND TRANSIENTS

7.5.1 Except as otherwise herein provided, the occupancy of a factory building or any of its sub-divisions shall be limited to not more than one person for every fifty square foot of floor area. No person shall be permitted to work less than six feet from the usual working place of the nearest worker, excepting where a specific manufacturing operation requires attendance of two workers at a lesser spacing, and then only where expressly approved.

7.5.2 The number of persons allowed in any working area shall not exceed under any circumstances the following maximum allowable operators and transients (including visitors, inspectors and plant employees) permitted at any time, in the specified operations:

OPERATION	NUMBER OF OPERATOR	TRANSIENT
Black powder magazine	none	one
Preliminary screening, weighing, pressing and loading, matching	one	one
Blender loading, removal of blended compositions	one	one
Coated magnesium powder drying	none	one

7.6 POSTING OF PERMISSIBLE OCCUPANCY AND MATERIAL QUANTITIES

7.6.1 A sign shall be conspicuously posted in every workroom or area indicating the maximum allowable number of operators and transients and quantity of materials that must not be exceeded in the room or area at any one time.

7.6.2 Each sign shall be painted on heavy cardboard with black letters at least one inch high on a white background and shall read as follows with the proper substitutions:

NOTICE

Not more than

() operators and () transients

() lbs. or units of (name of ingredients, composition or unit)

are permitted in this room at any one time

7.7 HEALTH, HYGIENE AND FIRST-AID

7.7.1 Approved first-aid kits shall be provided in advantageous locations throughout the plant. These kits are to be kept well stocked with suitable medicaments for treatments of burns.

7.7.2 There shall be suitably equipped dispensaries or first-aid room located away from the hazardous area. Additional first-aid kits shall be located only where deemed necessary by the plant physician.

7.7.3 At least one employee per operating shift but not less than two employees per hundred employees shall be trained and qualified in first-aid treatment.

7.7.4 Inasmuch as it is important to exclude the air from burned body areas, fire-proof blankets, in which to wrap employees who have been burned shall be provided and installed near each building.

7.7.5 Arrangements shall be made with a local hospital, clinic, or dispensary for treatment of major injuries.

7.7.6 Tanks, bath tubs or safety showers should be provided and located strategically throughout the plant, easily accessible to each operating building, but protected from the influence of a fire in any building and from freezing. Such devices should be so placed that the normal hazard is not increased by the possible contacts of water with material containing metallic powder.

7.7.7 A change house shall be located at or near the plant entrance. Washing and shower facilities shall be installed. All employees in hazardous areas should be provided with two lockers; one for street clothes and the other for work clothes. Lockers shall be of open type to permit official surveillance.

7.7.8 Persons processing explosive or toxic materials should change their clothing and take a shower bath at the end of each shift.

7.8 RESPIRATORS - persons employed in dusty atmospheres shall be provided with respirators of an approved type.

7.9 BATHS

7.9.1 Workmen processing explosive or toxic materials shall change their clothing and take a shower bath at the end of each shift.

7.10 PROCEDURE IN CASE OF FIRE OR EXPLOSION You're viewing an archived copy from the New Jersey State Library.

7.10.1 All employees shall be instructed carefully and thoroughly as to their behavior and procedure in case of fire or explosion, as well as to the location of electrical switches, fire-aid and safety equipment, permissible methods used in isolation of magnesium and aluminum powder fires, the hazard of raising a dust cloud, and the hazard of throwing liquids on an incipient fire of magnesium or aluminum powder.

7.11 FIGHTING A FLARE, SIGNAL, TRACER OR INCENDIARY FIRE

7.11.1 Only those employees who are familiar with the existing conditions are to be permitted near the area involved in a fire. First-aid fire extinguishers shall be available and all personnel instructed in the limitations of their use. Any fire should be attacked immediately and with energy, whenever and wherever there is likelihood of extinguishing the fire.

7.11.2 Local town or city firemen who might be called to the plant in case of fire, should be thoroughly instructed in the dangers of using jets of carbon dioxide, carbon tetrachloride, or water.

7.11.3 Dry, proprietary compounds available on the market may be used both as first-aid fire fighting equipment, and fighting a fire beyond the first-aid control. Jets of water, carbon tetrachloride or carbon dioxide should never be used directly on a magnesium fire.

7.11.4 Persons authorized to fight fire shall receive positive orders from their superiors by prior arrangements with respective officials, forbidding such first-aid equipment in combating any fire involving magnesium or aluminum.

7.11.5 Class 1 materials are principally a fire hazard. Class 2 materials are a fire hazard which generate intense heat. Class 9 materials may be expected to explode in a fire.

7.11.6 Signs entitled 'DO NOT USE WATER IN CASE OF FIRE' shall be posted on all buildings used for the storage of magnesium or aluminum.

7.12 POSTING DESCRIPTION OF HAZARDOUS OPERATIONS

7.12.1 A brief and accurate description of all operations which are considered hazardous shall be posted on the walls of the factory building or room. Copies of such posters shall be on file also in management's office. Such descriptions shall be submitted to the Commissioner for approval.

7.12.2 The management of each operating plant shall appoint a safety inspector having authority to enforce these regulations and make recommendations to the Commissioner.

7.13 SMOKING

7.13.1 Smoking and carrying of matches within the plant area is absolutely prohibited.

7.13.2 Areas in open air or buildings, either of which must be outside of the fence line surrounding the operating area, may be designated by the Commissioner as permissible smoking areas, if upon inspection, it is determined that no potential hazard exists in which case application for a smoking permit must be made to the Commissioner.

7.14 SEARCHES

7.14.1 A thorough search shall be made of all persons entering the plant to insure the removal of all matches, smoking materials and other harmful materials or foreign matter from their person.

7.15 A detailed report of any accident involving the following:

7.15.1 Lost time of more than one day for any injured employee.

7.15.2 Equipment damage in excess of \$100.00.

These must be reported by mail to the Bureau of Explosives at Trenton, N.J., within twenty-four hours after occurrence.

7.16 Any fire, however slight, must be reported by telephone immediately to the Bureau of Explosives at Trenton, excepting that between the hours of 5:30 P.M. and 9 A.M., such reports shall be made by telephone to the State House Operator, Trenton, New Jersey.

TABLE A - CLASS 2 - QUANTITY - DISTANCE TABLE

(Applicable to this Code only)

QUANTITY		DISTANCE*IN FEET FROM NEAREST (with or without barricade)	
Pounds (over)	Pounds (not over)	Building, railway or highway	Factory buildings and magazines**
100	1,000	75	50
1,000	5,000	115	75
5,000	10,000	150	100
10,000	20,000	190	125
20,000	30,000	215	145
30,000	40,000	235	155
40,000	**50,000	250	165
50,000	60,000	260	175
60,000	70,000	270	185
70,000	80,000	280	190
80,000	90,000	295	195
90,000	100,000	300	200
100,000	***200,000	375	250

TABLE B - CLASS 2A - QUANTITY - DISTANCE TABLE

(Applicable to this Code only)

QUANTITY		DISTANCE * IN FEET FROM NEAREST (with or without barricade)	
Pounds (over)	Pounds (not over)	Building, railway or highway	Factory buildings and magazines**
100	1,000	50	25
1,000	5,000	75	35
5,000	10,000	100	50
10,000	50,000	150	75
50,000	100,000	180	90

* Distance cannot be reduced by the use of barricades

** Maximum recommended

*** Maximum permitted

TABLE C - CLASS 9 - INTRAPLANT QUANTITY DISTANCE TABLE

QUANTITY OF EXPLOSIVES		DISTANCE IN FEET	
Pounds (over)	Pounds (not over)	Unbarricaded	Barricaded
10	25	40	20
25	50	60	30
50	100	80	40
100	200	100	50
200	300	120	60
300	400	130	65
400	500	140	70
500	750	160	80
750	1,000	180	90
1,000	1,500	210	105
1,500	2,000	230	115
2,000	3,000	260	130
3,000	4,000	280	140
4,000	5,000	300	150
5,000	6,000	320	160
6,000	7,000	340	170
7,000	8,000	360	180
8,000	9,000	380	190
9,000	10,000	400	200
10,000	12,500	420	210
12,500	15,000	450	225
15,000	17,500	470	235
17,500	20,000	490	245
20,000	25,000	530	265
25,000	30,000	560	280
30,000	35,000	590	295
35,000	40,000	620	310

NOTE: Ten (10) pounds or less may be stored in a separate building or in storage space properly separated by substantial dividing walls.

TABLE D - CLASS 9 - QUANTITY - DISTANCE TABLE
(Applicable in this Code only)

QUANTITY OF EXPLOSIVES				UNBARRICADED DISTANCE IN FEET FROM NEAREST		
Caps or Primers		Other Explosives		Building	Distance in feet from nearest	
Number over	Number not over	Pounds over	Pounds not over		Railway	Highway
1,000	5,000	---	---	30	20	10
5,000	10,000	---	20	60	40	20
10,000	20,000	---	40	120	70	35
20,000	25,000	---	50	145	90	45
25,000	50,000	50	100	240	140	70
50,000	100,000	100	200	360	220	110
100,000	150,000	200	300	520	310	150
150,000	200,000	300	400	640	380	190
200,000	250,000	400	500	720	430	220
250,000	300,000	500	600	800	480	240
300,000	350,000	600	700	860	520	260
350,000	400,000	700	800	920	550	280
400,000	450,000	800	900	980	590	300
450,000	500,000	900	1,000	1,020	610	310
500,000	750,000	1,000	1,500	1,060	640	310
750,000	1,000,000	1,500	2,000	1,200	720	320
1,000,000	1,500,000	2,000	3,000	1,300	780	360
1,500,000	2,000,000	3,000	4,000	1,420	850	390
2,000,000	2,500,000	4,000	5,000	1,500	900	420
2,500,000	3,000,000	5,000	6,000	1,550	940	450
3,000,000	3,500,000	6,000	7,000	1,610	980	470
3,500,000	4,000,000	7,000	8,000	1,660	1,000	500
4,000,000	4,500,000	8,000	9,000	1,700	1,020	510
4,500,000	5,000,000	9,000	10,000	1,740	1,040	520
5,000,000	7,500,000	10,000	15,000	1,870	1,070	530
7,500,000	10,000,000	15,000	20,000	1,950	1,170	580
10,000,000	12,500,000	20,000	25,000	2,110	1,270	630
12,500,000	15,000,000	25,000	30,000	2,260	1,360	680
15,000,000	17,500,000	30,000	35,000	2,410	1,450	720
17,500,000	20,000,000	35,000	40,000	2,550	1,530	760
		40,000	45,000	2,680	1,610	800
		45,000	50,000	2,800	1,680	840
		50,000	55,000	2,920	1,750	880
		55,000	60,000	3,030	1,820	910
		60,000	65,000	3,130	1,880	940
		65,000	70,000	3,220	1,940	970
		70,000	75,000	3,310	1,990	1,000
		80,000	80,000	3,390	2,040	1,020
		85,000	85,000	3,460	2,080	1,040
		90,000	90,000	3,520	2,120	1,060
		95,000	95,000	3,580	2,150	1,080
		100,000	100,000	3,630	2,180	1,090
		125,000	125,000	3,670	2,220	1,100
		150,000	150,000	3,800	2,280	1,140
		175,000	175,000	3,930	2,360	1,180
			200,000	4,060	2,440	1,220

NOTE:

The equivalence of number of caps or primers in terms of pounds of explosives as shown above is applicable also to Tables A and C.