NFPA 490

Code for the Storage of Ammonium Nitrate

2002 Edition

NFPA, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101
An International Codes and Standards Organization

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NFPA 490

Code for the

Storage of Ammonium Nitrate

2002 Edition

This edition of NFPA 490, *Code for the Storage of Ammonium Nitrate*, was prepared by the Technical Committee on Hazardous Chemicals and acted on by NFPA at its May Association Technical Meeting held May 19–23, 2002, in Minneapolis, MN. It was issued by the Standards Council on July 19, 2002, with an effective date of August 8, 2002, and supersedes all previous editions.

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Origin and Development of NFPA 490

NFPA 490 was developed by the Technical Committee on Storage, Handling, and Transportation of Hazardous Chemicals and was tentatively adopted by the Association in 1963. It was further amended and again tentatively adopted in 1964. After further revision, it was officially adopted in 1965. Amendments to NFPA 490 were adopted in 1967, 1969, and 1970. A complete revision was adopted in 1975, and several minor amendments were adopted in 1980 and 1985.

The 1993 edition of NFPA 490 incorporated amendments to the document. These changes enhanced its enforceability through revision of nonmandatory language provisions and conformance with the NFPA *Manual of Style*.

The 1998 edition of NFPA 490 incorporated amendments to the document that upgraded the criteria for automatic sprinkler protection, making them similar to the provisions for liquid and solid oxidizers as contained in NFPA 430, *Code for the Storage of Liquid and Solid Oxidizers*.

The 2002 edition of NFPA 490 contains minor revisions to make the document conform with the 2000 edition of NFPA's *Manual of Style*. These changes include renumbering of the chapters and creating a chapter for definitions.

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Contents

Chapter 1 Administration **490–** 4
1.1 Scope **490–** 4
1.2 Purpose **490–** 4
1.3 Application **490–** 4
1.4 Enforcement **490–** 4

Chapter 2 Referenced Publications **490–** 4
2.1 General **490–** 4
2.2 NFPA Publications **490–** 4
2.3 Other Publications **490–** 4

Chapter 3 Definitions **490–** 4
3.1 General **490–** 4
3.2 NFPA Official Definitions **490–** 4
3.3 General Definitions. (Reserved) **490–** 5

Chapter 4 General Provisions **490–** 5
4.1 Restricted Locations **490–** 5
4.2 Structures **490–** 5

Chapter 5 Storage of Ammonium Nitrate in Bags, Drums, or Other Containers **490–** 5
5.1 Containers **490–** 5
5.2 Piles **490–** 5

Chapter 6 Storage of Bulk Ammonium Nitrate **490–** 5
6.1 Structures **490–** 5
6.2 Compartments **490–** 5
6.3 Piles **490–** 6

Chapter 7 Contaminants **490–** 6
7.1 Separation **490–** 6
7.2 Prohibited Articles **490–** 6

Chapter 8 General Precautions **490–** 6
8.1 Electrical Installations **490–** 6
8.2 Housekeeping **490–** 6
8.3 Sources of Ignition **490–** 6
8.4 Signs **490–** 7
8.5 Vehicles and Lift Trucks **490–** 7
8.6 Handling Equipment **490–** 7
8.7 Lightning **490–** 7
8.8 Control of Access **490–** 7

Chapter 9 Fire Protection **490–** 7
9.1 Automatic Sprinklers **490–** 7
9.2 Extinguishing Devices **490–** 7

Annex A Explanatory Material **490–** 7

Annex B Properties and Uses of Ammonium Nitrate **490–** 8

Annex C Suggested Fire-Fighting Procedure **490–** 8

Annex D Suggested Provisions for Municipal Legal Regulations **490–** 9

Annex E Informational References **490–**10

Index **490–**11

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Code for the

Storage of Ammonium Nitrate

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NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Annex A.

Changes other than editorial are indicated by a vertical rule beside the paragraph, table, or figure in which the change occurred. These rules are included as an aid to the user in identifying changes from the previous edition. Where one or more complete paragraphs have been deleted, the deletion is indicated by a bullet between the paragraphs that remain.

Information on referenced publications can be found in Chapter 2 and Annex E.

Chapter 1 Administration

1.1 Scope.

1.1.1 This code shall apply to the storage of ammonium nitrate in the form of crystals, flakes, grains, or prills including fertilizer grade as defined by *Definitions and Test Procedures for Ammonium Nitrate Fertilizer*, dynamite grade, nitrous oxide grade, technical grade, and other mixtures containing 60 percent or more by weight of ammonium nitrate.

1.1.2 This code shall not apply to the transportation of ammonium nitrate.

1.1.3 This code shall not apply to storage under the jurisdiction of and in compliance with the regulations of the U.S. Coast Guard.

1.1.4* This code shall not apply to ammonium nitrate–based blasting agents.

1.1.5 The storage of ammonium nitrate and ammonium nitrate mixtures that are more sensitive than allowed by the *Definitions and Test Procedures for Ammonium Nitrate Fertilizer* shall not be permitted by this code except on the specific approval of the authority having jurisdiction.

1.1.6 Nothing in this code shall apply to the production of ammonium nitrate or to the storage of ammonium nitrate on the premises of the producing plant, provided that no distinct, undue hazard to the public is created.

1.2 Purpose. The purpose of this code is to provide for the safe storage of all grades ammonium nitrate containing 60 percent or more by weight of ammonium nitrate.

1.3 Application. This code shall apply to all persons, firms, corporations, co-partnerships, and associations storing, having, or keeping ammonium nitrate and to the owner or lessee of any building, premises, or structure in which ammonium nitrate is stored in quantities of 1000 lb (454 kg) or more.

1.4 Enforcement. This code shall be administered and enforced by the authority having jurisdiction designated by the governing authority. *(See Annex D for sample wording for enabling legislation.)*

Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this code and shall be considered part of the requirements of this document.

2.2 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 13, *Standard for the Installation of Sprinkler Systems,* 2002 edition.

NFPA 30, *Flammable and Combustible Liquids Code,* 2000 edition.

NFPA 58, *Liquefied Petroleum Gas Code,* 2001 edition.

NFPA 70, *National Electrical Code®,* 2002 edition.

NFPA 220, *Standard on Types of Building Construction,* 1999 edition.

NFPA 230, *Standard for the Fire Protection of Storage,* 1999 edition.

NFPA 430, *Code for the Storage of Liquid and Solid Oxidizers,* 2000 edition.

NFPA 495, *Explosive Materials Code,* 2001 edition.

2.3 Other Publications.

2.3.1 TFI Publication. The Fertilizer Institute, 820 First Street, NE, Washington, DC 20002.

Definitions and Test Procedures for Ammonium Nitrate Fertilizer, 1984.

Chapter 3 Definitions

3.1 General. The definitions contained in this chapter shall apply to the terms used in this code. Where terms are not included, common usage of the terms shall apply.

3.2 NFPA Official Definitions.

3.2.1* Approved. Acceptable to the authority having jurisdiction.

3.2.2* Authority Having Jurisdiction (AHJ). The organization, office, or individual responsible for approving equipment, materials, an installation, or a procedure.

3.2.3* Code. A standard that is an extensive compilation of provisions covering broad subject matter or that is suitable for adoption into law independently of other codes and standards.

3.2.4 Labeled. Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

3.2.5* Listed. Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.

3.2.6 Shall. Indicates a mandatory requirement.

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3.2.7 Should. Indicates a recommendation or that which is advised but not required.

3.3 General Definitions. (Reserved)

Chapter 4 General Provisions

4.1 Restricted Locations.

4.1.1 A permit shall be required from the authority having jurisdiction for the storage of 1000 lb (454 kg) or more of ammonium nitrate.

4.1.2 Not more than 60 tons (54.4 metric tons) of ammonium nitrate shall be stored unless the location and storage facility have been approved by the authority having jurisdiction.

4.1.3 Storage locations shall be subject to approval by the authority having jurisdiction with respect to proximity of residential occupancies, places of public assembly, schools, hospitals, railroads, and public highways. Limitations on storable quantities shall be considered with regard to proximity of these exposures and congested commercial or industrial districts.

4.1.4* Approval of large quantity storage shall be subject to due consideration of the fire and explosion hazards, including exposure to toxic vapors from burning or decomposing ammonium nitrate.

4.2 Structures.

4.2.1 Storage buildings shall not have basements unless the basements are open on at least one side. Buildings over one story in height shall not be used for storage, unless approved for such use.

4.2.2 Storage buildings shall have adequate ventilation or be of a construction that will be self-ventilating in the event of fire.

4.2.3* The wall on the exposed side of a storage building within 50 ft (15.2 m) of a combustible building, forest, piles of combustible materials, and similar exposure hazards shall be of Type I construction, as described in NFPA 220, *Standard on Types of Building Construction*. In lieu of the Type I wall, other equivalent means of exposure protection such as a freestanding wall shall be permitted to be used. The roof coverings shall be Class C or better.

4.2.4 All flooring in storage and handling areas shall be of noncombustible material or shall be protected against impregnation by ammonium nitrate; it shall be without open drains, traps, tunnels, pits, or pockets into which any molten ammonium nitrate could flow and be confined in the event of fire.

4.2.5 The continued use of an existing storage building or structure not in strict conformity with this code shall be approved by the authority having jurisdiction in cases where such continued use will not constitute a hazard to life or adjoining property.

4.2.6 Buildings and structures shall be dry and free from water seepage through the roof, walls, and floors.

Chapter 5 Storage of Ammonium Nitrate in Bags, Drums, or Other Containers

5.1 Containers. Bags and containers used for ammonium nitrate shall comply with the specifications and standards established by the U.S. Department of Transportation (DOT).

5.2 Piles.

5.2.1 Containers of ammonium nitrate shall not be accepted for storage when the temperature of the ammonium nitrate exceeds 130°F (54.4°C).

5.2.2 Bags of ammonium nitrate shall not be stored within 30 in. (762 mm) of the walls and partitions of the storage building.

5.2.3 The height of piles shall not exceed 20 ft (6.1 m). The width of piles shall not exceed 20 ft (6.1 m). The length of piles shall not exceed 50 ft (15.2 m).

Exception: Where the building is of noncombustible construction or is protected by automatic sprinklers, the length of piles shall not be limited.

5.2.4 In no case shall the ammonium nitrate be stacked closer than 3 ft (0.9 m) below the roof or supporting and spreader beams overhead.

5.2.5 Aisles shall be provided to separate piles by a clear space of not less than 3 ft (0.9 m) in width. At least one service or main aisle in the storage area shall be not less than 4 ft (1.2 m) in width.

5.2.6 Where storage facilities are located in remote areas, the requirements for pile sizes and aisles, as set forth in 5.2.3 through 5.2.5, shall be permitted to be waived by the authority having jurisdiction.

Chapter 6 Storage of Bulk Ammonium Nitrate

6.1 Structures.

6.1.1 Warehouses shall have adequate ventilation or be capable of adequate ventilation in case of fire.

6.1.2 Bulk storage structures shall not exceed a height of 40 ft (12.2 m).

Exception No. 1: Where bulk storage structures are constructed of noncombustible material.

Exception No. 2: Where adequate facilities for fighting a roof fire are available.

6.2 Compartments.

6.2.1 Bins shall be clean and free of materials that can contaminate ammonium nitrate.

6.2.2* Due to the corrosive and reactive properties of ammonium nitrate and to avoid contamination, galvanized iron, copper, lead, and zinc shall not be used in bin construction except where these bins are suitably protected against ammonium nitrate. Aluminum bins, and wooden bins protected against impregnation by ammonium nitrate, are permissible.

Exception: Where bins are suitably protected.

6.2.3 The warehouse shall be permitted to be subdivided into any desired number of ammonium nitrate storage compartments or bins. The partitions dividing the ammonium nitrate storage from the storage of other products that would contaminate the ammonium nitrate shall be of tight construction.

6.2.4 The ammonium nitrate storage bins or piles shall be clearly identified by signs reading AMMONIUM NITRATE with letters at least 2 in. (50.8 mm) high.

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6.3 Piles.

6.3.1 Piles or bins shall be sized and arranged so that all material in the pile is moved out periodically in order to minimize possible caking of the stored ammonium nitrate.

6.3.2* Height or depth of piles shall be limited by the pressure-setting tendency of the product. However, in no case shall the ammonium nitrate be piled higher at any point than 3 ft (0.9 m) below the roof or supporting and spreader beams overhead.

6.3.3 Ammonium nitrate shall not be accepted for storage when the temperature of the product exceeds 130°F (54.4°C).

6.3.4 Dynamite, other explosives, and blasting agents shall not be used to break up or loosen caked ammonium nitrate.

Chapter 7 Contaminants

7.1 Separation.

7.1.1 Ammonium nitrate shall be in a separate building or shall be separated by approved fire partitions of not less than 1-hour fire endurance from storage of any of the following:

(1) Organic chemicals, acids or other corrosive materials
(2) Materials that can require blasting during processing or handling
(3) Compressed flammable gases
(4) Flammable and combustible materials
(5) Other contaminating substances including, but not limited to the following:
  (a) animal fats
  (b) baled cotton
  (c) baled rags
  (d) baled scrap paper
  (e) bleaching powder
  (f) burlap or cotton bags
  (g) caustic soda
  (h) coal
  (i) coke
  (j) charcoal
  (k) cork
  (l) camphor
  (m) excelsior
  (n) fibers of any kind
  (o) fish oils
  (p) fish meal
  (q) foam rubber
  (r) hay
  (s) lubricating oil
  (t) linseed oil or other oxidizable or drying oils
  (u) naphthalene
  (v) oakum
  (w) oiled clothing
  (x) oiled paper
  (y) oiled textiles
  (z) paint
  (aa) straw
  (bb) sawdust
  (cc) wood shavings
  (dd) vegetable oil

7.1.2 Walls referred to in 7.1.1 shall only have to extend to the underside of the roof.

7.1.3 In lieu of separation walls, ammonium nitrate shall be permitted to be separated from the materials referred to in 7.1.1 by a space of at least 30 ft (9.1 m) or more as required by the authority having jurisdiction, and sills or curbs shall be provided to prevent mixing during fire conditions.

7.1.4 Flammable liquids such as gasoline, kerosene, solvents, and light fuel oils shall not be stored on the premises.

Exception: Where such storage conforms to NFPA 30, Flammable and Combustible Liquids Code, and where walls and sills or curbs are provided in accordance with 7.1.1 through 7.1.3.

7.1.5 LP-Gas shall not be stored on the premises.

Exception: Where such storage conforms to NFPA 58, Liquefied Petroleum Gas Code.

7.2 Prohibited Articles.

7.2.1 Sulfur and finely divided metals shall not be stored in the same building with ammonium nitrate.

Exception: Where such storage conforms to NFPA 495, Explosive Materials Code.

7.2.2 Explosives and blasting agents shall not be stored in the same building with ammonium nitrate.

Exception: Explosives and blasting agents shall be permitted to be stored in the same building with ammonium nitrate on the premises of makers, distributors, and user–compounders of explosives or blasting agents.

7.2.2.1 Where explosives or blasting agents are stored in separate buildings, other than on the premises of makers, distributors, and user–compounders of explosives or blasting agents, they shall be separated from the ammonium nitrate by the distances or barricades specified in Table 6-4.2 of NFPA 495, *Explosive Materials Code.*

7.2.2.2 Storage or operations on the premises of makers, distributors, and user–compounders of explosives or blasting agents shall conform to NFPA 495, *Explosive Materials Code.*

Chapter 8 General Precautions

8.1 Electrical Installations.

8.1.1 Electrical installations shall conform to the requirements of NFPA 70, *National Electrical Code®*, for ordinary locations. They shall be designed to minimize damage from corrosion.

8.1.2 Electric lamps shall be located or guarded so as to preclude contact with bags or other combustible materials.

8.2 Housekeeping.

8.2.1 Good housekeeping shall be maintained.

8.2.2 If contents of broken bags are uncontaminated, they shall be permitted to be salvaged by placing the damaged bag inside a clean, new slipover bag and closing it securely. Other spilled materials and discarded containers shall be promptly gathered and disposed of in a safe manner.

8.3 Sources of Ignition. Open flames and smoking shall be prohibited in storage buildings, and this shall not include heating units approved by the authority having jurisdiction.

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8.4 Signs. All points of entry to commercial warehouses in which ammonium nitrate is stored shall be properly identified with durable signs meeting the following specifications:

(1) Signs shall have background and letters in contrasting colors.
(2) Signs shall be worded AMMONIUM NITRATE, with letters at least 2 in. (50.8 mm) high.

8.5 Vehicles and Lift Trucks.

8.5.1 Internal combustion motor vehicles, lift trucks, and cargo conveyors shall not be permitted to remain unattended in a building where ammonium nitrate is stored.

Exception: Such vehicles shall be permitted to remain unattended in a building where ammonium nitrate is stored if parked in an area that will prevent a vehicle fire from spreading.

8.5.2* Fork trucks, tractors, platform lift trucks, and other specialized industrial trucks used within the warehouse shall be maintained so that fuels or hydraulic fluids do not contaminate the ammonium nitrate.

8.6* Handling Equipment. Hollow spaces in nitrate handling equipment, where nitrate could collect and be confined under sufficiently high pressure to become a source of explosion in the event of fire, shall be avoided.

8.7* Lightning. In areas where lightning storms are prevalent, lightning protection shall be provided.

8.8 Control of Access. Provisions shall be made to prevent unauthorized personnel from entering the ammonium nitrate storage area.

Chapter 9 Fire Protection

9.1 Automatic Sprinklers.

9.1.1 Not more than 2500 tons (2268 metric tons) of bagged ammonium nitrate shall be stored in a building or structure not equipped with an automatic sprinkler system.

Exception: A quantity of bagged ammonium nitrate greater than 2500 tons (2268 metric tons) shall be permitted to be stored in a building or structure not equipped with an automatic sprinkler system if approved by the authority having jurisdiction.

9.1.2 When determining whether greater quantities shall be permitted without sprinkler protection, the authority having jurisdiction shall take into consideration proximity of the storage building to congested areas and the possible presence of contaminants in the storage building.

9.1.3 Sprinkler protection shall be permitted to be required by the authority having jurisdiction for the storage of less than 2500 tons (2268 metric tons) of ammonium nitrate where location of the building or the presence of other stored materials can present a special hazard.

9.1.4 Sprinkler systems shall be of the approved type and installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*.

9.1.5 Sprinkler systems shall be designed in accordance with NFPA 230, *Standard for the Fire Protection of Storage*. Ammonium nitrate in noncombustible or combustible containers (paper bags or noncombustible containers with removable combustible liners) shall be designated as a Class I commodity. Where contained in fiber packs or noncombustible containers in combustible packaging, it shall be designated as a Class 3 commodity. Where contained in plastic containers, it shall be designated as a Class 2 commodity.

9.2 Extinguishing Devices.

9.2.1* Suitable fire control devices such as small hose or portable extinguishers shall be provided throughout the warehouse and in the loading and unloading areas.

9.2.2* Water supplies and fire hydrants shall be available in accordance with recognized good practices and as required by the authority having jurisdiction.

9.2.3 The requirements for automatic sprinklers, water supplies, and fire hydrants set forth in 9.1.4 and 9.2.2 shall be permitted to be waived by the authority having jurisdiction where storage facilities are located in remote areas.

Annex A Explanatory Material

Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs.

A.1.1.4 See NFPA 495, *Explosive Materials Code*.

A.3.2.1 Approved. The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

A.3.2.2 Authority Having Jurisdiction (AHJ). The phrase "authority having jurisdiction," or its acronym AHJ, is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

A.3.2.3 Code. The decision to designate a standard as a "code" is based on such factors as the size and scope of the document, its intended use and form of adoption, and whether it contains substantial enforcement and administrative provisions.

A.3.2.5 Listed. The means for identifying listed equipment may vary for each organization concerned with product evalu-

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ation; some organizations do not recognize equipment as listed unless it is also labeled. The authority having jurisdiction should utilize the system employed by the listing organization to identify a listed product.

A.4.1.4 Ammonium nitrate is capable of detonating with the blast effect of about half the quantity of explosives if heated under confinement that permits high-pressure build-up or if subjected to strong shocks, such as those from an explosive. The sensitivity of ammonium nitrate to detonation is increased by elevated temperatures or by contamination. *(See Chapter 7.)*

A.4.2.3 See NFPA 203, *Guide on Roof Coverings and Roof Deck Constructions*.

A.6.2.2 Steel or wood can be protected by special coatings such as sodium silicate, epoxy coatings, or polyvinyl chloride coatings.

A.6.3.2 Pressure setting is a factor affected by humidity and temperature in the storage space and by pellet quality. Temperature cycles through 90°F (32°C) and high atmospheric humidity are undesirable for storage in depth.

A.8.5.2 It is recommended that electric or LP-Gas powered trucks be employed rather than gasoline or diesel to reduce the potential for contamination to ammonium nitrate.

A.8.6 Examples of hollow spaces include hollow conveyor rollers and hollow screw conveyor shafts.

A.8.7 See NFPA 780, *Standard for the Installation of Lightning Protection Systems*.

A.9.2.1 See NFPA 10, *Standard for Portable Fire Extinguishers*, and NFPA 14, *Standard for the Installation of Standpipe, Private Hydrant, and Hose Systems*.

A.9.2.2 See NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*.

Annex B Properties and Uses of Ammonium Nitrate

This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

B.1 Ammonium nitrate (as used in this publication, refers only to solid forms of ammonium nitrate) is a compound containing nitrogen, hydrogen, and oxygen (NH_4NO_3). It is commercially produced by reacting nitric acid with ammonia and evaporating the resultant solution of ammonium nitrate to make a concentrated ammonium nitrate melt, which is then spray granulated in a prilling tower or pelletized or flaked by some other means.

For interstate shipments, the U.S. Department of Transportation classifies ammonium nitrate as an oxidizing material, as it does some other fertilizer products such as sodium nitrate, potassium nitrate, and calcium nitrate. Such oxidizing materials can yield oxygen upon decomposition under fire conditions and will, therefore, under proper conditions of mixing, vigorously support combustion if involved in a fire with combustible materials. Ammonium nitrate is capable of undergoing detonation with about half the blast effect of explosives, if heated under confinement that permits high-pressure build-up, or if subjected to strong shocks, such as those from an explosive. The sensitivity of ammonium nitrate to detonation increases at elevated temperatures.

Industrial use of ammonium nitrate extends to use as an ingredient in blasting agents. When a carbonaceous or organic substance such as fuel (or diesel) oil, nut hulls, or carbon black is added and mixed in with ammonium nitrate, the mixture could become a blasting agent. A blasting agent is any material or mixture consisting of a fuel and oxidizer that is intended for blasting, not otherwise classed as an explosive, and in which none of the ingredients is classified as an explosive, provided that the finished product, as mixed and packaged for use or shipment, cannot be detonated by means of a No. 8 test blasting cap when unconfined. *(See NFPA 495, Explosives Materials Code.)*

Recent test data on ammonium nitrate are included in the U.S. Bureau of Mines Report of Investigations 6746, *Sympathetic Detonation of Ammonium Nitrate and Ammonium Nitrate Fuel Oil;* Report of Investigations 6903, *Further Studies on Sympathetic Detonation;* and Report of Investigations 6773, *Explosion Hazards of Ammonium Nitrate Under Fire Exposure*. On the basis of these reports, a Table of Recommended Separation Distances of Ammonium Nitrate and Blasting Agents from Explosives or Blasting Agents has been developed *(See Table 6-4.2 of NFPA 495, Explosive Materials Code)*.

While blasting agents should not be confused with fertilizer products, extreme care should be taken to ensure that stored ammonium nitrate does not become sensitized by intimate mixing with carbonaceous, organic, or combustible material.

Mixed fertilizers containing less than 60 percent ammonium nitrate are not covered by this code.

With proper precautions against fire and explosion, ammonium nitrate can be stored safely at a plant, in distributors' warehouses, or on a farm.

Annex C Suggested Fire-Fighting Procedure

This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

C.1 Should a fire break out in an area where ammonium nitrate is stored, it is important that the mass be kept cool and the burning be promptly extinguished. Apply large volumes of water as quickly as possible. If fires reach massive and uncontrollable proportions, fire-fighting personnel should evacuate the area and withdraw to a safe location.

C.2 Provide as much ventilation as possible to the fire area. Rapid dissipation of both the products of decomposition and the heat of reaction is very important.

C.3 Approach the fire from upwind as the vapors from burning ammonium nitrate are very toxic. Self-contained breathing apparatus of types approved by the U.S. Bureau of Mines should be used to protect personnel against gases.

C.4 After extinguishment of the fire, the loose and contaminated unsalvageable ammonium nitrate should be buried or dumped in water, where permissible. Any residue that cannot be removed by sweeping should be washed away with hose. Flushing and scrubbing of all areas should be very thorough to ensure the dissolving of all residue. Wet empty bags should be removed, permitted to dry out, and then burned outdoors.

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Annex D Suggested Provisions for Municipal Legal Regulations

This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

Where this code is used as the basis for municipal legal regulations, the following provisions are suggested as an aid to enforcement.

D.1 Title. This ordinance shall be known as "an ordinance regulating the storage, having, and keeping of ammonium nitrate in the City of [ ]" and shall be permitted to be referred to as "The Ammonium Nitrate Storage Ordinance."

Note that the title should conform with local law and practice.

D.2 Definitions.

D.2.1 Chief. The Chief of the Fire Department or his or her authorized representative is hereby designated as "the authority having jurisdiction" wherever that expression appears in the ordinance.

D.2.2 Jurisdiction. "Jurisdiction" wherever used in this ordinance shall mean the City of [ ].

D.2.3 Permit. The term "Permit," wherever used in this ordinance, shall mean the written authority of the [ ] issued pursuant to this ordinance to store, have, or keep pure, fertilizer, or other grades of ammonium nitrate and mixtures containing 60 percent or more by weight of ammonium nitrate and that are classified as oxidizing materials by the authority having jurisdiction (usually by the U.S. Department of Transportation).

D.3 Application. This ordinance shall apply to all persons, firms, corporations, partnerships, governmental agencies except federal, and associations storing, having, or keeping ammonium nitrate and to the owner or lessee of any building or premises in or on which ammonium nitrate is stored or kept.

D.4 Permitted Locations.

D.4.1 The storage of ammonium nitrate in quantities of 1000 lb (454 kg) or more is prohibited within the following limits.

Note that these limits are to be specified according to local zoning ordinances. They should include all residential, mercantile, and other congested districts.

D.4.2 No permit shall be issued until approval has been given for the proposed storage location with respect to proximity to places of public assembly, schools, hospitals, and churches, and adequacy of water supply for fire control.

D.5 Retroactivity. The chief can issue a permit for the continued use of an existing warehouse, storage facility, handling equipment, building, and structure for the storage of ammonium nitrate that is not in strict compliance with the terms of this ordinance in cases where continued use will not constitute a distinct hazard to life or adjoining property. In cases where such permit is denied, the chief shall notify the applicant and specify the reasons for denial in writing.

D.6 Permits.

D.6.1 A permit issued pursuant to this ordinance shall be obtained from the chief to store, have, or keep, in quantities of 1000 lb (454 kg) or more, pure, fertilizer, and other grades of ammonium nitrate, and mixtures containing 60 percent or more by weight of ammonium nitrate and that are classified as oxidizing materials (usually by the Department of Transportation) by the authority having jurisdiction.

D.6.2 Permits shall not be transferable.

D.6.3 Each permit granted by the chief shall be valid for such period as might be specified but not to exceed one year, shall be a revocable license, and shall expire when revoked.

D.7 Inspection and Approval.

D.7.1 Application for a permit to use or operate facilities for the storage, having, or keeping of ammonium nitrate as herein required shall be made in writing to the chief. The chief shall then cause an inspection to be made of the premises and equipment proposed to be used. If they are found to be in compliance with this ordinance, a statement to that effect shall be noted on the application and the application signed by the person making the inspection. The chief shall thereupon issue a permit as applied for.

D.7.2 The chief can at any reasonable time inspect premises, buildings, installations, or equipment for the storage and handling of ammonium nitrate. If a violation of this ordinance is found to exist, the chief shall file with the owner, occupant, or operator a notice citing the violation and ordering its correction. If such order is not complied with, the chief can suspend the permit issued for such facility.

D.7.3 In the event that an inspection reveals a violation of this ordinance serious enough in the chief's opinion to constitute a clear and present danger to the public safety, the chief shall take whatever measures are necessary to correct, abate, or remove the hazard or condition.

D.8 Modification. The chief shall have the power to grant exemption from application of the ordinance upon request, in writing, to do so when such request shows that the enforcement of the ordinance will cause unnecessary hardship to the petitioner, provided that said request shall not be granted where the requested use will constitute a distinct hazard to life or adjoining property. The particulars of such exemptions when granted shall be entered upon the permit issued. A copy thereof shall be retained by the chief.

D.9 Appeals.

D.9.1 An owner, lessee, agent, operator, or occupant aggrieved by any order issued pursuant to this ordinance can file an appeal to the City Council within ten days from the service of such an order, and the City Council shall fix a time and place not less than five days nor more than ten days thereafter when and where such appeal can be heard by it. Such appeal shall stay the execution of such order until it has been heard and reviewed, vacated, or confirmed. Nothing in this section shall be construed as preventing the chief from taking any action indicated elsewhere in this ordinance.

Note that this section should conform to local law and practice with respect to terminology and designation of agency to hear appeals.

D.9.2 The City Council shall at such hearing affirm, modify, revoke, or vacate such order. Unless revoked or vacated, such order shall then be complied with.

D.9.3 Nothing therein contained shall be deemed to deny the right of any person, firm, corporation, partnership, or voluntary association to appeal from an order or decision of the City Council to a court of competent jurisdiction. Such appeal

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shall stay the execution of such order until it has been heard and reviewed, vacated, or confirmed.

D.10 Penalties. Any person who shall violate any of the provisions of this ordinance or fail to comply therewith, or who shall violate or fail to comply with any order made thereunder, or who shall build in violation of any detailed statement of specifications or plans submitted and approved thereunder, or any certificate or permit issued thereunder, and from which no appeal has been taken, or who shall fail to comply with such an order as affirmed or modified by the City Council or by a court of competent jurisdiction, within the time fixed herein shall severally for each and every violation and noncompliance, respectively, be guilty of a misdemeanor, punishable by a fine of not less than [ ] or by imprisonment for not less than [ ] days nor more than [ ] days or by both such fine and imprisonment. The imposition of one penalty for any violation shall not excuse the violation or permit it to continue; and all such persons shall be required to correct or remedy such violations or defects within a reasonable time; and when not otherwise specified, each ten days that prohibited conditions are maintained shall constitute a separate offense. The application of the foregoing penalty shall not be held to prevent the enforced removal of prohibited conditions.

D.11 Repeal of Conflicting Ordinances. All former ordinances or parts thereof conflicting with the provisions of this ordinance are hereby repealed.

D.12 Severability. The City Council hereby declares that, should any section, paragraph, sentence, or word of this ordinance be declared, for any reason, to be invalid, it is the intent of said City Council that it would have passed all other portions of this ordinance independent of the elimination herefrom of any such portion as might be declared invalid.

D.13 Effective Date. This ordinance shall take effect upon [ ] of [ ].

Annex E Informational References

E.1 Referenced Publications. The following documents or portions thereof are referenced within this code for informational purposes only and are thus not part of the requirements of this document unless also listed in Chapter 2.

E.1.1 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 10, *Standard for Portable Fire Extinguishers*, 1998 edition.

NFPA 14, *Standard for the Installation of Standpipe, Private Hydrant, and Hose Systems*, 2000 edition.

NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*, 2002 edition.

NFPA 203, *Guide on Roof Coverings and Roof Deck Constructions*, 2000 edition.

NFPA 495, *Explosive Materials Code*, 2001 edition.

NFPA 780, *Standard for the Installation of Lightning Protection Systems*, 2000 edition.

E.1.2 Other Publications.

E.1.2.1 U.S. Government Publications. U.S. Bureau of Mines, Pittsburgh Mining and Safety Research Center, 4800 Forbes Avenue, Pittsburgh, PA 15213.

Report of Investigations 6746, *Sympathetic Detonation of Ammonium Nitrate and Ammonium Nitrate Fuel Oil*, 1966

Report of Investigations 6773, *Explosion Hazards of Ammonium Nitrate Under Fire Exposure*, 1966

Report of Investigations 6903, *Further Studies on Sympathetic Detonation*, 1966

E.2 Informational References. (Reserved)

E.3 References for Extracts. (Reserved)

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-A-

Access, control of 8.8
Aisles 5.2.5, 5.2.6
Ammonium nitrate, properties and uses of ..... Annex B
Appeals D.9
Application of code 1.3
Approved (definition) 3.2.1, A.3.2.1
Authority having jurisdiction
Definition 3.2.2, A.3.2.2

-B-

Bag storage ..... Chap. 5
Bins 6.2, A.6.2.2
Blasting agents 7.2.2
Buildings, storage 4.2, 6.1, A.4.2.3
Bulk storage ..... Chap. 6, A.6.2.2, A.6.3.2

-C-

Chief ..... *see* Fire chief
Code (definition) 3.2.3, A.3.2.3
Compartments 6.2, A.6.2.2
Container storage 5.1, 5.2.1
Contaminants ..... Chap. 7

-D-

Definitions ..... Chap. 3
Detonation A.4.1.4
Drum storage ..... Chap. 5

-E-

Electrical installations 8.1
Enforcement of code 1.4
Explosives 7.2.2
Extinguishers, portable fire 9.2.1, A.9.2.1

-F-

Fire chief
Definition D.2.1
Fire-fighting procedure ..... Annex C
Fire protection ..... Chap. 9, A.9.2.1, A.9.2.2
Flammable liquids 7.1.4

-H-

Handling equipment 8.6, A.8.6
Hose, small 9.2.1, A.9.2.1
Housekeeping 8.2
Hydrants, fire 9.2.2, 9.2.3, A.9.2.2

-I-

Ignition sources 8.3
Industrial trucks 8.5, A.8.5.2
Inspection D.7

-J-

Jurisdiction (definition) D.2.2

-L-

Labeled (definition) 3.2.4
Legal regulations, municipal ..... Annex D
Lift trucks 8.5, A.8.5.2
Lightning protection 8.7, A.8.7
Listed (definition) 3.2.5, A.3.2.5
Locations
Permitted D.4
Restricted 4.1, A.4.1.4
LP-Gas 7.1.5

-M-

Metals, finely divided 7.2.1
Municipal legal regulations ..... Annex D

-P-

Penalties D.10
Permits 4.1.1, D.4.2, D.6
Definition D.2.3
Retroactive D.5
Piles
Bulk storage 6.2.4, 6.3, A.6.3.2
Container 5.2
Prohibited storage 7.2
Purpose of code 1.2

-R-

References ..... Chap. 2, Annex E
Restricted locations 4.1, A.4.1.4

-S-

Scope of code 1.1, A.1.1.4
Shall (definition) 3.2.6
Should (definition) 3.2.7
Signs 8.4
Sprinkler systems 9.1, 9.2.3
Storage
Bulk ..... Chap. 6, A.6.2.2, A.6.3.2
Container ..... Chap. 5
Large quantities 4.1.4, A.4.1.4
Piles 5.2, 6.2.4, 6.3, A.6.3.2
Prohibited articles 7.2
Separation 7.1
Storage buildings ..... *see* Buildings, storage
Structures 4.2, 6.1, A.4.2.3
Sulfur 7.2.1

-T-

Trucks, industrial 8.5, A.8.5.2

-V-

Vehicles 8.5, A.8.5.2

-W-

Water supplies 9.2.2, 9.2.3, A.9.2.2

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