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Tentative Code for the

STORAGE OF AMMONIUM NITRATE

May, 1964



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This pamphlet circulates for review and comment these recommendations of the NFPA Committee on Chemicals and Explosives which were Tentatively Adopted at the 1964 NFPA Annual Meeting.

Comments are solicited on these Tentative Recommendations from all those interested. Such comments should be forwarded to the NFPA Office by Sept. 10, 1964 to receive full Committee consideration.

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NATIONAL FIRE PROTECTION ASSOCIATION

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60 Batterymarch Street, Boston, Massachusetts 02110

National Fire Protection Association

International

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Tentative Code for the Storage of Ammonium Nitrate

NFPA No. 490-T — 1964

This Tentative Code was prepared by the Sectional Committee on Storage, Handling, and Transportation of Hazardous Chemicals, approved by the Committee on Chemicals and Explosives. It was tentatively adopted in 1963, and in revised form was again tentatively adopted in 1964.

Sectional Committee on Storage, Handling and Transportation of Hazardous Chemicals

Deputy Chief **Raymond M. Hill**, *Chairman*

W. J. Baker
Mathew M. Braidech
A. C. Clark*
W. H. Doyle
Reynold J. Green
Joseph A. Houghton
Garrett B. James, Sr.

P. E. Johnson
R. W. Klefer
Dr. Richard Y. LeVine
F. J. McClain
(alt. to W. H. Doyle)
W. G. McKenna
Norman Nordwick

Harry J. Parker
Roy Petersen
S. J. Porter
R. W. Scott
Eric Shackleton
Herman D. Spaeth
P. T. Truitt
Dr. Robert W. Van Dolah

Committee on Chemicals and Explosives

Dr. Robert W. Van Dolah, *Chairman*,

Explosives Research Center, Bureau of Mines, U. S. Department of the Interior,
4800 Forbes Ave., Pittsburgh, Pa. 15213

Chester I. Babcock,† *Secretary*,

National Fire Protection Assn., 60 Batterymarch St., Boston, Mass. 02110

D. R. Abbey, Don Mills, Ont., Canada.
(Personal)

Charles W. Bahme, Northridge, Calif.
(Personal)

Arthur G. Baker, Mutual Fire Inspection Bureau of New England.

W. J. Baker, Conference of Special Risk Underwriters.

William J. Bradford, Manufacturers Mutual Fire Ins. Co. (Personal)

Mathew M. Braidech, American Chemical Society and National Board of Fire Underwriters.

Clyde L. Brown, Bureau of Mines, U. S. Dept. of the Interior.

W. J. Burns, Munitions Carriers Conference.

Carrol E. Burtner, The Boeing Co. (Personal)

R. A. Carpenter, Manufacturing Chemists' Assn., Inc.

A. C. Clark*, Manufacturing Chemists' Assn., Inc.

John D. Cook, National Automatic Sprinkler & Fire Control Assn.

Dr. Glenn H. Damon, Bureau of Mines, U. S. Dept. of the Interior.

Donald A. Diehl, Compressed Gas Assn., Inc.

W. H. Doyle, Factory Insurance Assn.

R. E. Dufour, Underwriters' Laboratories, Inc.

Thomas E. Duke, Fire Prevention & Engineering Bureau of Texas.

Howard H. Fawcett, General Electric Co. (Personal)

Forrest S. Forbes, United States Air Force. (Personal)

Reynold J. Green, Manufacturing Chemists' Assn., Inc.

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*Appointed subsequent to preparation of this text.

†Non-voting member.

- Wm. E. Grubert**, Conference of Special Risk Underwriters.
- Jones F. Harbarger**, Thiokol Chemical Corp. (Personal)
- Deputy Chief Raymond M. Hill**, Fire Marshals Assn. of North America.
- Joseph A. Houghton**, Liberty Mutual Fire Ins. Co. (Personal)
- R. P. Howell**, American Petroleum Institute.
- James Hyslop**, American Mining Congress.
- Garrett B. James, Sr.**, (Personal)
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- F. J. McClain**, Factory Insurance Assn.
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- Paul T. Truitt**, National Plant Food Institute.
- W. C. Westerberg**, Underwriters' Laboratories, Inc.
- F. W. Wischmeyer**, Eastman Kodak Co. (Personal)
- F. J. Zeleny**, Panel 14, National Electrical Code Com., and Factory Insurance Assn.

Alternates.

- Charles Anthony**, Compressed Gas Assn., Inc. (Alternate to Donald A. Diehl.)
- S. P. Axe**, American Petroleum Institute. (Alternate to R. P. Howell.)
- R. P. Day**, Factory Insurance Assn. (Alternate to F. J. McClain.)
- W. H. Doyle**, Factory Insurance Assn. (Alternate to F. J. Zeleny as FIA representative.)
- W. F. Hickes**, Instrument Society of America. (Alternate to F. L. Maltby.)
- George O. Hunt, Jr.**, Manufacturing Chemists' Assn., Inc. (Alternate to R. J. Green.)
- S. B. Johnson**, National Plant Food Institute. (Alternate to P. T. Truitt.)
- F. J. McClain**, Factory Insurance Assn. (Alternate to W. H. Doyle.)
- Baron Whitaker**, Underwriters' Laboratories, Inc. (Alternate to W. C. Westerberg.)

FOREWORD

Ammonium nitrate is a compound containing nitrogen, hydrogen and oxygen (NH_4NO_3) and is commercially produced by combining nitric acid with ammonia, 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 Interstate Commerce Commission of the United States 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, vigorously support combustion if involved in a fire with combustible materials. Ammonium nitrate is capable of undergoing detonation if heated under confinement that permits high pressure build-up, or if subjected to strong shocks, such as those from an explosive.

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

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

Mixed fertilizers containing less than 60 per cent ammonium nitrate are not covered by this Code.

With proper precautions, ammonium nitrate can be stored safely at the plant, in distributors' warehouses or on the farm.

CHAPTER 1. SCOPE AND DEFINITIONS

11. Scope

111. This Code applies to the storage of ammonium nitrate in the form of crystals, flakes, grains or prills including fertilizer grade, dynamite grade, nitrous oxide grade, technical grade and other mixtures containing 60 per cent or more ammonium nitrate by weight but does not apply to blasting agents.

112. It shall not apply to the transportation of ammonium nitrate.

113. It shall not apply to storage under the jurisdiction of and in compliance with the Regulations of the United States Coast Guard.

114. The storage of ammonium nitrate that does not meet the definition for fertilizer grade ammonium nitrate as specified by the National Plant Food Institute* shall not be permitted by this Code except on the specific approval of the authority having jurisdiction.

12. Definitions

121. APPROVED. The term APPROVED shall mean approved by the authority having jurisdiction.

*"Definition and Test Procedures for Ammonium Nitrate Fertilizer," available from the National Plant Food Institute, 1700 K Street, N.W., Washington 6, D. C. This definition limits the contents of organic materials, metals, sulfur, etc., in a product that may be classified ammonium nitrate fertilizer.

CHAPTER 2. GENERAL PROVISIONS

21. Application

211. 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 1,000 pounds or more.

212. Not more than 60 tons of ammonium nitrate shall be stored unless the location and storage facility have been approved.

22. Restricted Locations.

221. Storage locations shall be subject to approval by the authority having jurisdiction with respect to nearness 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.

222. Approval of large quantity storage shall be subject to due consideration of possible toxic vapors from burning ammonium nitrate.

23. Structures

231. Storage buildings shall not be over one story in height or have basements, unless approved for such use, and shall be equipped with lightning rod protection if located in an area where lightning storms are prevalent. (See the Lightning Code, NFPA No. 78.)

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

233. The wall on the exposed side of a storage building within 50 feet of a combustible building, forest, piles of

combustible materials and similar exposure hazards shall be of fire-resistive or noncombustible construction. In lieu of the fire-resistive or noncombustible wall, other means of exposure protection such as outside automatic sprinklers or free standing walls may be used. The roof coverings shall be Class C or better, as defined in Roof Coverings, NFPA No. 203.

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

235. The continued use of an existing storage building or structure not in strict conformity with this Code may be approved in cases where such continued use will not constitute a hazard to life or adjoining property.

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

CHAPTER 3. STORAGE OF AMMONIUM NITRATE IN BAGS, DRUMS, OR OTHER CONTAINERS

31. Container

311. Bags and containers used for ammonium nitrate must comply with specifications and standards required for use in interstate commerce.

312. Containers used on the premises in the actual manufacturing or processing need not comply with provisions of Section 311.

32. Piles

321. Containers of ammonium nitrate shall not be accepted for storage when the temperature of the ammonium nitrate exceeds 130°F.

322. Bags of ammonium nitrate shall not be stored within 30 inches of the storage building walls and partitions.

323. The width of piles shall not exceed 20 feet and the length 50 feet except that where the building is of noncombustible construction or is protected by automatic sprinklers the length of piles shall not be limited. In no case shall the ammonium nitrate be stacked closer than 36 inches below the roof or supporting and spreader beams overhead.

324. Aisles shall be provided to separate piles by a clear space of not less than 3 feet in width. At least one service or main aisle in the storage area shall be not less than 4 feet in width.

325. The requirements for pile sizes and aisles, as set forth in Sections 323 and 324, may be waived by the authority having jurisdiction where storage facilities are located in remote areas.

CHAPTER 4. STORAGE OF BULK AMMONIUM NITRATE

41. Location

411. Bulk storage of ammonium nitrate shall be permitted only after specific approval by the authority having jurisdiction.

42. Structures

421. Bulk storage may be in covered open piles, in bins in warehouses, or in silo-type structures.

422. Warehouses, if of combustible construction, shall have adequate ventilation or be capable of adequate ventilation in case of fire.

423. Unless constructed of noncombustible material, bulk storage structures shall not exceed a height of 40 feet.

43. Compartments

431. Bins shall be clear and free of materials which may contaminate ammonium nitrate.

432. 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 unless suitably protected. Aluminum bins, and wooden bins protected against impregnation by ammonium nitrate, are permissible.*

433. The warehouse may be subdivided by tight partition walls into any desired number of ammonium nitrate storage compartments or bins.

44. Piles

441. Piles or bins shall be so sized and arranged that all material in the pile is moved out periodically.

442. 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

*Steel or wood can be protected by special paint or other coatings resistant to ammonium nitrate.

point than 36 inches below the roof or supporting and spreader beams overhead.*

443. Ammonium nitrate shall not be accepted for storage when the temperature of the product exceeds 130° F.

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

CHAPTER 5. CONTAMINANTS

51. Separation

511. Ammonium nitrate shall be separated by approved type walls of not less than one hour fire-resistance rating from storage of organic chemicals, acids or corrosive liquids, compressed flammable gases, flammable and combustible materials or other contaminating substances including but not limited to animal fats, baled cotton, baled rags, baled scrap paper, bleaching powder, burlap or cotton bags, caustic soda, coal, coke, charcoal, cork, camphor, excelsior, fibers of any kind, fish oils, fish meal, foam rubber, hay, lubricating oil, linseed oil, or other oxidizable or drying oils, naphthalene, oakum, oiled clothing, oiled paper, oiled textiles, paint, straw, sawdust, wood shavings, or vegetable oils. Walls referred to in this section need extend only to the underside of the roof.

512. In lieu of separation walls, ammonium nitrate may be separated from the materials referred to in Section 511 by a space of at least 30 feet or more as required by the authority having jurisdiction, and if necessary, sills or curbs shall be provided to prevent mixing during fire conditions.

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

513. Flammable liquids such as gasoline, kerosine, solvents and light fuel oils shall not be stored on the premises except as provided by the Flammable and Combustible Liquids Code, NFPA No. 30.

514. LP-Gas shall not be stored on the premises except as provided by the Standard for the Storage and Handling of Liquefied Petroleum Gases, NFPA No. 58.

52. Prohibited Articles

521. Sulfur and finely divided metals shall not be stored in the same building with ammonium nitrate except as provided in the Code for the Manufacture, Transportation, Storage, and Use of Explosives and Blasting Agents, NFPA No. 495.

522. Explosives and blasting agents shall not be stored in the same building or on the premises with ammonium nitrate unless proper distances are maintained in accordance with the American Table of Distances for the total quantity of explosives, blasting agents and ammonium nitrate. (See the Code for the Manufacture, Transportation, Storage, and Use of Explosives and Blasting Agents, NFPA No. 495.)

CHAPTER 6. GENERAL PRECAUTIONS

61. Electrical Installations

611. Electrical installations shall conform to the requirements of the National Electrical Code, NFPA No. 70. They shall be designed to minimize damage from corrosion.

62. Housekeeping

621. Good housekeeping shall be maintained.

622. Uncontaminated contents of broken bags may be salvaged by placing the damaged bag inside a clean, new slipover bag and closing securely. Other spilled materials and discarded containers shall be promptly gathered and disposed of in a safe manner.

63. Open Lights and Flames

631. Open lights or flames and smoking shall be prohibited in storage buildings but this is not meant to exclude heating units approved by the authority having jurisdiction.

64. Signs

641. 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 inches high.

65. Vehicles and Lift Trucks

651. Internal combustion motor vehicles, lift trucks and cargo conveyers shall not be permitted to remain overnight in a building where ammonium nitrate is stored unless parked in an area approved exclusively for such parking purposes.

652. Fork trucks, tractors, platform lift trucks and other specialized industrial trucks used within the warehouse shall conform to the requirements of at least the GS, LPS, DS or EE designated units set forth in the Standard for the Use, Maintenance and Operation of Industrial Trucks, NFPA No. 505.

CHAPTER 7. FIRE PROTECTION

71. Automatic Sprinklers

712. Unless the storage of a greater quantity is approved by the authority having jurisdiction, not more than 2,500 tons of ammonium nitrate shall be stored in a building or structure not equipped with an automatic sprinkler system. When determining whether greater quantities shall be permitted without sprinkler protection, the authority having jurisdiction shall take into consideration exposure of the storage building to built-up areas, possible presence of contaminants in the storage building, and the availability of water supplies. Sprinkler protection may be required for the storage of less than 2,500 tons of ammonium nitrate where location of the building or the presence of other stored materials may present a special hazard.

713. Sprinkler systems shall be of approved type and installed in accordance with the Standard for the Installation of Sprinkler Systems, NFPA No. 13, for ordinary hazard occupancy classification.

72. Extinguishing Devices.

721. Suitable fire control devices such as small hose or portable extinguishers shall be provided throughout the warehouse and in the loading and unloading areas. (See the Standard for the Installation, Maintenance and Use of Portable Fire Extinguishers, NFPA No. 10, and the Standard for the Installation of Standpipe and Hose Systems, NFPA No. 14.)

722. Water supplies and fire hydrants shall be available in accordance with recognized good practices and as required by the authority having jurisdiction. (See the Standard for Outside Protection, NFPA No. 24.)

723. The requirements for automatic sprinklers, water supplies and fire hydrants set forth in Sections 712 and 722 may be waived by the authority having jurisdiction when storage facilities are located in remote areas.

APPENDIX A. SUGGESTED FIRE FIGHTING PROCEDURE

A1. 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 place.

A2. 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.

A3. 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.

A4. After extinction 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 hoses. Flushing and scrubbing of all areas should be very thorough to insure the dissolving of all residue. Wet empty bags should be removed, permitted to dry out and then burned out of doors.

APPENDIX B. SUGGESTED PROVISIONS FOR MUNICIPAL LEGAL REGULATIONS

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

B11. Title

B111. This ordinance shall be known as “an ordinance regulating the storage, having and keeping of ammonium nitrate in the City of,” and may be referred to as “The Ammonium Nitrate Storage Ordinance.”

NOTE: The title should conform with local law and practice.

B12. Definitions

B121. Chief. The Chief of the Fire Department or his authorized representative is hereby designated as “the authority having jurisdiction” wherever that expression appears in the ordinance.

B122. Jurisdiction. “Jurisdiction” whenever used in this ordinance shall mean the City of

B123. Permit. The term “Permit,” whenever 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 per cent or more by weight of ammonium nitrate and which are classified as oxidizing materials (usually by the Interstate Commerce Commission) by the authority having jurisdiction.

B13. Application

B131. This ordinance shall apply to all persons, firms, corporations, co-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.

B14. Permitted Locations

B141. The storage of ammonium nitrate in quantities of 1,000 pounds or more is prohibited within the following limits:

NOTE: These limits are to be specified according to local zoning ordinances. They should include all residential, mercantile, and other congested districts.

B142. No permit shall be issued until approval has been given for the proposed storage location with respect to nearness to places of public assembly, schools, hospitals and churches, and adequacy of water supply for fire control.

B15. Retroactivity

B151. The chief may issue a permit for the continued use of an existing warehouse, storage facility, handling equipment, building and structure for the storage of ammonium nitrate which is not in strict compliance with the terms of this ordinance in cases in which 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.

B16. Permits

B161. A permit issued pursuant to this ordinance shall be obtained from the chief to store, have or keep, in quantities of 1000 pounds or more, pure, fertilizer and other grades of ammonium nitrate, and mixtures containing 60 per cent or more by weight of ammonium nitrate and which are classified as oxidizing materials (usually by the Interstate Commerce Commission) by the authority having jurisdiction.

B162. Permits shall not be transferable.

B163. Each permit granted by the chief shall be valid for such period as may be specified but not to exceed one year and shall be a revocable license, and shall expire when revoked.

B17. Inspection and Approval

B171. 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 to be made an inspection 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.

B172. The chief may 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, he 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 may suspend the permit issued for such facility.

B173. In the event that an inspection reveals a violation of this ordinance serious enough in his 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.

B18. Modification

B181. The chief shall have the power to grant exemption from application of the ordinance upon request in writing so to do 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.

B19. Appeals

B191. An owner, lessee, agent, operator, or occupant aggrieved by any order issued pursuant to this ordinance may 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 may be heard