NFPA 434
Code for the Storage of Pesticides

1998 Edition

National Fire Protection Association, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101
An International Codes and Standards Organization

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NFPA 434

Code for the

Storage of Pesticides

1998 Edition

This edition of NFPA 434, *Code for the Storage of Pesticides*, was prepared by the Technical Committee on Hazardous Chemicals and acted on by the National Fire Protection Association, Inc., at its Annual Meeting held May 18–21, 1998, in Cincinnati, OH. It was issued by the Standards Council on July 16, 1998, with an effective date of August 5, 1998, and supersedes all previous editions.

Changes other than editorial are indicated by a vertical rule in the margin of the pages on which they appear. These lines are included as an aid to the user in identifying changes from the previous edition.

This edition of NFPA 434 was approved as an American National Standard on August 6, 1998.

Origin and Development of NFPA 434

At the 1974 NFPA Annual Meeting, the Sectional Committee on Storage, Handling, and Transportation of Hazardous Chemicals obtained tentative adoption of this code. As a tentative NFPA document, it was circulated for review and comment. Based on the comments received, the tentative code was revised and preprinted in the 1975 NFPA Fall Meeting Technical Committee Report and was again subject to public review and comment. The comments received were considered by the Sectional Committee, and their actions were published in the 1975 NFPA Fall Meeting Technical Committee Documentation.

The first edition of NFPA 43D was officially adopted by the Association at its 1975 Fall Meeting in Pittsburgh, Pennsylvania, on November 19, 1975. It contained those requirements that the Sectional Committee believed to be essential for the safe storage of pesticides in portable containers. It was processed in accordance with the NFPA Regulations Governing Technical Committees.

Minor amendments were adopted at the 1980 NFPA Fall Meeting and at the 1984 NFPA Fall Meeting.

The 1994 edition of NFPA 43D was a complete revision; the title of the code was changed from *Code for the Storage of Pesticides in Portable Containers*, to *Code for the Storage of Pesticides*. The document was completely revised to update the requirements for safe handling, fire prevention, and storage provisions for restricted-use pesticides. Restricted-use pesticides are those pesticides that are required by the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) to bear the human signal word "Danger" or those pesticides that, when evaluated by NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response*, are determined to have health hazard ratings of "3" or "4."

The NFPA Committee on Hazardous Chemicals completely revised the 1994 edition to make it compatible with industry practices and other industry standards and to incorporate regulatory provisions that have changed since the previous edition of the code.

The 1998 edition includes a change to the numbering of the document from NFPA 43D to NFPA 434. It also adds a new Appendix B, which is a listing of typical pesticides.

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NOTE: Membership on a committee shall not in and of itself constitute an endorsement of the Association or any document developed by the committee on which the member serves.

Committee Scope: This Committee shall have primary responsibility for documents on, and maintain current codes for, classes of hazardous chemicals and codes for specific chemicals when these are warranted by virtue of widespread distribution or special hazards.

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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 Appendix A.

Information on referenced publications can be found in Chapter 4 and Appendix D.

Chapter 1 Administration

1-1 Scope.

1-1.1 This code shall apply to both inside and outside storage of pesticides as described in this code.

1-1.2* This code shall apply to restricted use pesticides, which are required by the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), 40 *CFR,* Part 152.175, to bear the human signal word "Danger" [as defined in 40 *CFR,* Part 156.10(i)(A)] or those restricted-use pesticides, which when evaluated against NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response,* (Health Hazard Warning Determination), are determined to be rated as "3" or "4."

1-1.3 This code shall not apply to sanitizers and disinfectants covered by other codes.

1-1.4 This code shall not apply where storage at a site is equal to or less than 1000 gal (3790 L) or 10,000 lb (4540 kg). This code shall not apply where pesticide storage time in a calendar year is 14 days or less.

Exception No. 1: Hazard identification as specified in Section 2-6 shall apply to all pesticide storage facilities.

Exception No. 2: This code shall apply to tank trucks, rail cars, or any other transportation vehicle involved in the temporary pesticide storage. (See 2-2.2.3.)

1-1.5 Existing buildings storing pesticides that do not comply with the requirements of this code pertaining to noncombustible construction and fixed fire protection shall be permitted to be used at the discretion of the authority having jurisdiction, provided their use does not constitute a distinct hazard to life or adjoining property.

1-2 Purpose. The purpose of this code is to provide for the safe storage of pesticides and the safe mitigation of releases of these materials where involved in fire and nonfire incidents.

1-3 Applicability of Other Documents. The requirements of NFPA 30, *Flammable and Combustible Liquids Code;* NFPA 30B, *Code for the Manufacture and Storage of Aerosol Products;* NFPA 430, *Code for the Storage of Liquid and Solid Oxidizers;* NFPA 231, *Standard for General Storage;* NFPA 231C, *Standard for Rack Storage of Materials;* and NFPA 490, *Code for the Storage of Ammonium Nitrate,* shall apply where applicable and where they are more restrictive than this code.

1-3.1 Pesticides covered in this code that are stored in the same facility with oxidizers shall be stored in accordance with NFPA 430, *Code for the Storage of Liquid and Solid Oxidizers.*

1-3.2 Pesticides stored in the same facility with ammonium nitrate fertilizer shall be stored in accordance with NFPA 490, *Code for the Storage of Ammonium Nitrate.*

1-4 Equivalency. Nothing in this code is intended to prevent the use of systems, methods, or devices equivalent to those prescribed by this code, provided that technical documentation is submitted to the authority having jurisdiction that demonstrates equivalency, and provided that the system, method, or device is approved for the intended purpose.

1-5 Definitions. The following terms shall, for the purpose of this code, be defined as follows.

Approved.* Acceptable to the authority having jurisdiction.

Authority Having Jurisdiction.* The organization, office, or individual responsible for approving equipment, an installation, or a procedure.

Basement. A story of a building or structure having one-half or more of its height below ground level and to which access for fire-fighting purposes is unduly restricted.

Closed Container. A container sealed by means of a lid, closure, valve, adhesive closure, or other device so that liquid, vapors, or dusts cannot escape under ordinary conditions of use or handling.

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.

Commercial User. A person, such as a commercial grower, a certified applicator, a pest control operator, a fumigator, or a greenhouse operator, who stores pesticides in a storage building or storage area to which the public ordinarily does not have access.

Container. Any bag, bottle, carton, can, pressurized container, drum, portable tank, or other closed vessel containing a pesticide.

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.

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 identified standards or has been tested and found suitable for a specified purpose.

Material Safety Data Sheet (MSDS). The document that describes composition of a material, hazardous properties and hazard mitigation, and disposal information prepared in accordance with the Occupational Safety and Health Administration (OSHA) hazard communication standard (29 *CFR,* Part 1910.1200, "Hazard Communication").

Person. Any individual, partnership, association, fiduciary, corporation, or any organized group of persons, whether or not incorporated.

Pest. Any unwanted plant, animal, or microorganism, including insects, rodents, nematodes, fungi, weeds, bacteria, or virus.

Pesticide. Any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest or for use as a plant regulator, defoliant, or desiccant.

Restricted-Use Pesticide. Pesticides classified for restricted use under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) in 40 *CFR*, Part 152.175. These pesticides shall be permitted to be purchased and applied by applicators who are certified and licensed in accordance with the U.S. Environmental Protection Agency (EPA) regulations.

Secondary Containment. Any device or structure that prevents environmental contamination when the primary container or its appurtenances fail. Secondary containment shall be designed and constructed to intercept and contain pesticide spills and leaks and to prevent runoff or leaching of pesticides into the environment. Examples of secondary containment include dikes, curbing, and double-walled tanks.

Segregated. Storage in the same room as, but physically separated from, other materials.

Shall. Indicates a mandatory requirement.

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

Warehouse. Any building, structure, or portion thereof used for storage of pesticides.

Chapter 2 General Requirements

2-1 Hazard Management.

2-1.1 No person shall construct or significantly modify a pesticide storage facility unless the construction plans are reviewed and approved by the authority having jurisdiction.

2-1.2* No person shall store materials covered by this code until a hazardous materials management response plan and an emergency response plan have been completed and approved by the authority having jurisdiction. *(See Appendix C.)*

2-1.2.1 An emergency response coordinator shall be designated on the emergency response plan. The coordinator shall be responsible for implementing the emergency response plan and coordinating with outside agencies.

2-1.2.2 Equipment and materials necessary for implementing the emergency response plan shall be available and accessible.

2-1.2.3 The authority having jurisdiction shall be notified immediately when any release of pesticide occurs. The authority having jurisdiction shall be notified immediately when a release of pesticides occurs that might pose a threat to people, property, or the environment or that exceeds the capability of the facility to manage the release.

2-1.2.4 The facility responsible for an accidental release shall activate the emergency response plan immediately.

2-1.2.5 The emergency response plan shall be reviewed when facilities are modified, or biennially, whichever is more frequent.

2-1.2.6 The hazardous materials management response plan shall be reviewed when facilities are modified, or biennially, whichever is more frequent.

2-1.3 No person shall close or abandon any pesticide storage facility without notifying the authority having jurisdiction at least 30 days prior to the scheduled closing.

2-1.4 Housekeeping.

2-1.4.1 Accumulation of combustible waste materials in pesticide storage areas shall be prohibited.

2-1.4.2 Unsaleable Goods. A plan shall be written for the disposition of unsaleable goods, such as off-spec materials and goods in damaged packaging. The disposition of unsaleable goods shall be permitted to be in accordance with the manufacturer's recommendations and the pesticide label directions; the disposal shall be in accordance with local, state, and federal regulations; or the goods shall be returned to the manufacturer. These materials shall be segregated until disposition.

2-1.4.3 Disposition. Pesticide-contaminated materials shall be disposed of or decontaminated in accordance with appropriate federal, state, and local regulations as specified by the manufacturer's instructions.

2-1.4.4 Leakage of Containers. Leaking or damaged containers of pesticides shall be dealt with immediately by using overpacking or repackaging, or other approved methods. Overpacked material shall be segregated and stored until final disposition in accordance with the manufacturer's instructions.

2-1.4.5 Pallets. Contaminated pallets shall be disposed of with other pesticide-contaminated materials.

2-2 Structures and Buildings.

2-2.1 Buildings, or portions thereof, in which pesticides are stored shall be constructed of noncombustible materials.

Exception: Where protected by an approved automatic fire protection system, combustible construction shall be permitted.

2-2.2 Floors. Floors shall be constructed and maintained to contain and control spillage and fire-fighting water.

2-2.2.1 Spill Control. Containment or drainage shall be provided to prevent the flow of pesticides during emergency conditions into adjoining building areas, property, or critical natural resources.

2-2.2.2 Drainage. Pesticide spills and fire-fighting water shall be either contained inside the facility or directed by a drainage system to outside, secondary containment. The capacity of the system shall be able to accommodate the following:

(a) The amount contained in the largest pesticide storage container

Exception: If pesticides are stored in a nonsprinklered building, provide containment for the maximum volume of stored liquids.

(b) Twenty minutes of fire-fighting water as specified in Section 2-4, if applicable

(c) One-hundred-year rainfall during a 24-hour period, if outdoors

2-2.2.3 Temporary Storage. Tank trucks, rail cars, or any other transportation vehicle involved in temporary storage of

pesticides at any one facility for three days or longer shall be provided with secondary containment.

2-2.3 Ventilation.

2-2.3.1 Indoor storage areas and buildings for the storage of pesticides shall be provided with emergency mechanical exhaust ventilation, which shall be manually actuated upon detecting a spill, leak, or release.

2-2.3.2 The ventilation system shall be designed to do the following:

(a)*It shall maintain the pesticide concentration below the accepted human exposure levels, or for a minimum of six air changes per hour, whichever method yields the higher number of air changes.

(b) The location of both the exhaust and inlet air openings shall be arranged to provide, as far as practicable, air movements across all portions of the floor to prevent accumulation of toxic or flammable vapors. Air shall be exhausted from the room directly to the exterior of the building without recirculation.

2-2.4 Electrical installations shall be in conformance with NFPA 70, *National Electrical Code®*.

2-2.5 Illumination. The pesticide storage area shall be illuminated as necessary to allow ready identification of pesticide container labeling.

2-3 Control of Ignition Sources.

2-3.1 Smoking shall be prohibited in all storage areas containing pesticides.

2-3.2 "No Smoking" signs shall be placed conspicuously within storage areas and at all entrances to storage areas.

2-3.3 Cutting or welding procedures shall be in conformance with NFPA 51B, *Standard for Fire Prevention in Use of Cutting and Welding Processes*.

2-4* Fire Protection. A risk assessment shall be performed by a competent individual to determine the extent and type of fire protection to be provided. The assessment shall consider materials stored, life safety considerations, containers, extinguishing media, storage methods, and environmental considerations. The results shall be approved by the authority having jurisdiction.

2-5 Loading and Unloading Facilities. Loading and unloading facilities shall have secondary containment. The secondary containment shall have a liquidtight floor and shall be sloped or curbed to prevent overflow. This containment shall be permitted to be connected to the drainage system *(see 2-2.2.2)* or shall be permitted to be contained at the unloading area.

2-6 Hazard Identification. All pesticide storage facilities shall have a hazard identification system.

2-6.1 Signs. All pesticide storage areas shall be identified as such by a sign in accordance with NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response*. Additionally, a sign that reads PESTICIDES in black 2-in. (5-cm) letters on a white background shall be posted. These signs shall be located in accordance with the authority having jurisdiction and shall meet EPA requirements.

2-6.2 Container Labels. Each container shall have a legible FIFRA label on the outside of the container that is visible from the usual directions of approach.

2-7 Training. Facilities storing pesticides shall have a training program. The training shall be based on current material safety data sheets (MSDS) and other information supplied by manufacturers.

2-7.1 Persons responsible for the operation and maintenance of areas in which pesticides are stored shall be trained in the chemical and physical hazards of the stored materials and combinations of stored materials. The training shall include adequate coverage of other topical areas as required by 29 *CFR*, Part 1910.1200, Occupational Safety and Health Administration, "Hazard Communication."

2-7.2 Persons responsible for the operation and maintenance of areas in which pesticides are stored shall be trained to understand the sequence of mitigation and protective actions necessary to contain and control pesticide releases. These persons shall be trained to competencies identified for the first responder operational level as described in NFPA 472, *Standard for Professional Competence of Responders to Hazardous Materials Incidents*.

2-7.3 Emergency response coordinators shall be trained to meet the requirements of incident commander or safety officer competency levels as described in NFPA 472, *Standard for Professional Competence of Responders to Hazardous Materials Incidents*.

2-7.4 Persons designated as responders to pesticide releases expected to perform defensive or offensive actions shall be trained to meet all requirements of 29 *CFR*, Part 1910.120, Occupational Safety and Health Administration, "Hazardous Waste Operations and Emergency Response," and the requirements of the technician level as described in NFPA 472, *Standard for Professional Competence of Responders to Hazardous Materials Incidents*.

Chapter 3 Storage

3-1 Separation Requirements. Pesticide storage shall be separated from food and personal contact items such as clothing, linens, furniture, animal feeds, and animal health products by a liquidtight wall.

3-2 Segregation of Incompatible Materials. Incompatible materials shall not be stored within 25 ft (7.6 m) of pesticide storage areas unless separated by a liquidtight wall with a fire-resistance rating of 1 hour.

3-3 Pesticide Storage Location. Pesticides shall be stored only on the first floor. Any other storage or occupancy in a basement below the pesticide storage shall be approved by the authority having jurisdiction.

3-4 Storage Conditions.

3-4.1 Pesticides shall be stored to prevent deleterious contact with moisture, excessive heat, or freeze/thaw cycles, which can affect either container integrity or product stability.

3-4.2 Empty, unrinsed containers shall be treated as full containers.

3-4.3 Compressed Gas Pesticides.

3-4.3.1 Compressed gas pesticides shall be stored away from heat (e.g., steam pipes, heaters, direct sun) in an outdoor, covered area.

3-4.3.2 Containers shall be tightly closed, provided with a safety cap when not in use, whether full or empty, and provided with labeling to indicate whether the individual container is full or empty.

3-4.3.3* Containers shall be separated by type, contents, and full or empty status. Compressed gas pesticides shall be separated from other compressed gases by pipe railings or other effective means acceptable to the authority having jurisdiction.

3-5 Storage Arrangements.

3-5.1 Containers shall be stacked stably, and stacks shall be limited in height, based on container integrity.

3-5.2 Where an original shipping container has been opened, the individual container shall be placed on stable shelving.

3-5.3 Where flammable or combustible pesticides are stored, storage shall comply with NFPA 30, *Flammable and Combustible Liquids Code*.

3-5.4 Nonflammable pesticides shall be stored in accordance with NFPA 231, *Standard for General Storage*.

3-5.5 Rack storage of nonflammable pesticides shall comply with NFPA 231C, *Standard for Rack Storage of Materials*.

Chapter 4 Referenced Publications

4-1 The following documents or portions thereof are referenced within this code as mandatory requirements and shall be considered part of the requirements of this code. The edition indicated for each referenced mandatory document is the current edition as of the date of the NFPA issuance of this code. Some of these mandatory documents might also be referenced in this code for specific informational purposes and, therefore, are also listed in Appendix D.

4-1.1 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 30, *Flammable and Combustible Liquids Code*, 1996 edition.

NFPA 30B, *Code for the Manufacture and Storage of Aerosol Products*, 1998 edition.

NFPA 51B, *Standard for Fire Prevention in Use of Cutting and Welding Processes*, 1994 edition.

NFPA 70, *National Electrical Code®*, 1999 edition.

NFPA 231, *Standard for General Storage*, 1998 edition.

NFPA 231C, *Standard for Rack Storage of Materials*, 1998 edition.

NFPA 430, *Code for the Storage of Liquid and Solid Oxidizers*, 1995 edition.

NFPA 472, *Standard for Professional Competence of Responders to Hazardous Materials Incidents*, 1997 edition.

NFPA 490, *Code for the Storage of Ammonium Nitrate*, 1998 edition.

NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response*, 1996 edition.

4-1.2 U.S. Government Publications. U.S. Government Printing Office, Superintendent of Documents, Washington, DC 20402.

Code of Federal Regulations, Title 29, Part 1910.120 (OSHA), "Hazardous Waste Operations and Emergency Response."

Code of Federal Regulations, Title 29, Part 1910.1200 (OSHA), "Hazard Communication."

Code of Federal Regulations, Title 40, Parts 152.175 and 156.10(i)(A).

Appendix A Explanatory Material

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

A-1-1.2 Additional examples of agricultural pesticides covered by this code can be found in the *Farm Chemicals Handbook*. *(See Appendix B.)*

A-1-5 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-1-5 Authority Having Jurisdiction. The phrase "authority having jurisdiction" 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-1-5 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-1-5 Listed. The means for identifying listed equipment may vary for each organization concerned with product evaluation; 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-2-1.2 Some materials covered by this code also have to comply with specific federal, state, and local regulations, as applicable.

A-2-2.3.2(a) The ventilation rate should be based on the following:

(a) The amount of the pesticide spilled, based on the worst credible case, which is dependent on the capacity of the largest stored pesticide container

(b) The volatility of the pesticide spilled (i.e., its vapor pressure)

(c) The accepted human exposure level as specified on the pesticide material safety data sheet (MSDS) or the pesticide container label

A-2-4 Restricted-use pesticides represent unique commercial products in our society. They are biocidal products that generally are manufactured, stored, and used widely. The hazards of the active ingredients and formulated products vary widely in their target life forms, severity, and persistence. These materials and their byproducts of degradation and combustion can adversely affect the use of the structures where they are made, formulated, and stored as well as cause harmful exposures to animal and human populations and natural resources.

The combustibility and fire-induced failure mode of the packaging used for these pesticide products affects their ability to burn and to propagate fire. Container failures are of particular importance, not only because they can contribute to the additional release of combustible or flammable material, but they allow the uncontrolled release of pesticides into the environment. The latter is a special concern in terms of human health and the environment.

The potential losses associated with a release, with or without fire, should be evaluated from a larger perspective than conventional loss prevention assessments for commercial industrial occupancies. The first consideration in any release or fire impact scenario should be adequate preparation for the evacuation of employees and customers from the facility. Thereafter, all other factors should balance the potential for loss between property and the environment. Some of these factors are as follows.

(a) *Location and Site Factors.* At facilities involved with highly volatile materials, large fuel loads, and materials having toxic characteristics or toxic byproducts, the evaluation should consider the following:

1. Are there nearby human populations that could be affected by a release?
2. Are there unique or high-value environmental resources that could be affected by credible release?
3. In a fire situation, can adjacent property and environmental assets be protected?

(b) *Other Occupancy Factors.* The risk assessment should consider the implications of releases to those portions of the structure not used for pesticide storage and to occupants of the structure.

(c) *Packaging.* Most pesticides are found in commerce as formulated products of a pesticidal active ingredient(s), diluents, and adjuvants. They are usually found in one of three forms: liquid, dry formulations, and contained gases.

Most dry formulations (e.g., tablets, pellets, powders, dusts, and granules) usually are packaged in combustible bags, in boxes, and in fiber or plastic containers of various sizes. Solvent and water-soluble bags are also utilized for some dry pesticide products. Liquid formulations (e.g., aqueous or solvent-based emulsions, suspensions, and solutions) usually are packaged in metal or plastic containers of various sizes, some of which are pressurized.

The combustibility and fire-induced failure mode of the packaging used for these pesticide products affects their ability to burn and to propagate fire. Container failures are of particular importance because they can contribute to the additional release of combustible or flammable materials.

(d) *Chemical Properties.* In addition to the inherent structural fire-loading, some pesticide products have unique chemical properties that pose special fire risks. For example, on contact with water, aluminum phosphide fumigant produces phosphene, a highly toxic flammable gas having an autoignition temperature of 212°F (100°C). These special fire risks should be considered in the risk assessment.

(e) *Mixed Product Storage.* The assessment should consider segregated storage schemes for pesticide materials with significantly different toxicity, flammability, and residue characteristics. A complete analysis will assess mixed commodity storage and displays involving pesticide and nonpesticide materials. Fires in such mixed storage locations can increase or reduce the combustion process.

(f) *Smoke and Liquid Runoff.* Smoke is generated when combustion occurs. Some amount of stoichiometric combustion of pesticide products can form relatively harmless gases. However, some dusts or vaporized pesticide materials or toxic degradation products also could be present inside the fire's smoke plume. These airborne materials will reach the ground and can cause contamination.

Liquid runoff is created both as a result of product leakage from ruptured containers and from fire-fighting water (from sprinkler system discharge or hose streams). This liquid runoff, if beyond the capacity of the secondary containment provided, could contain pesticides and other toxic chemicals released during the fire and could contaminate the facility, the surrounding soil, and the adjacent ground and surface water.

(g) *Contaminated Debris.* The disposition of contaminated building debris and soil, damaged product containers and contents, and contaminated runoff water resulting from a fire where a facility is damaged or destroyed should be considered. Not only does this present a cleanup problem, but this contaminated material exposes the surrounding property to further contamination if storm runoff is not contained. A risk assessment should consider the potential impact on human health and the environment of runoff from such pesticide-contaminated debris.

(h) *Emergency Response.* The capability and availability of emergency response, including location, equipment, and training, should be considered.

A-3-4.3.3 NFPA 55, *Standard for the Storage, Use, and Handling of Compressed and Liquefied Gases in Portable Cylinders*, can be consulted for additional information on the storage of cylinder gases.

Appendix B Typical Pesticides

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

Table B-1 provides a list of typical pesticides.

Table B-1 Typical Pesticides with Signal Word "Danger"*

2,4-DB
3,5-Xylyl Methylcarbamate
4-aminopyridine
Accord™
Acifon™
Advantage™
Aero Dyne-Amic™
Agribrom™
Agrofuran™
Agroxone™
Aldicarb
Aldoxycarb
Aldrin
alpha-Naphthylacetic Acid
Aluminum Phosphate
Amconil™
Amid-Thin™
Anilofos
Aniloguard™
Apache™
Arapam™
Arbex™
Arsenic Acid
Arvest™
Assert™
Attatox™
Avenge™
Avitrol™
Azinophos-ethyl
Azinophos-methyl
Azodrin™

Banox™
Banrot™
BareSpot™ Monobor-Chlorate
BareSpot™ Ureabor
Baygon™
Baythroid™
Baythroid 2™
Baythroid H™
Bidrin™
Bifenox
Birlane™
Bladafum™
Blasticidin-S
Blattanex™
Blazer™
Bomyl
Bounty™
Bravo™
Bravo Ultrex™
Broadstrike™ Plus
Brodifacoum
Brom-O-Gas™
Brom-O-Sol™
Busan 1236™
Butifos
Butoxone™
Butyrac™

Caid™
Calcium Arsenate
Calcium Cyanide
Camphechlor
Capfos™
Carbodan™
Carbofuran
Carbosan™
Carbosulfan
Carboxin
Carpene™
Carzol™
Charge™
Chipco™ Mocap™
Chipco™ Ronstar™
Chiptox™
Chlorfenvinphos
Chlorflurenol-methyl
Chlormephos
Chlorophacinone
Chlorothalonil
Chlorpropham
Chlorthiophos
Chlortram™
Chromated Copper Arsenate
Cildon™
Ciodrin™
ClortoCaffaro™
Clortosip™
Cobra™
Colonil™
Comite™
Commando™
Commodore™
Contraven™
Contur™
Copper 8-Quinolinolate
Copper Acetoarsenite
Copper Hydroxide
Copper Sulfate
Co-Rax™
Corrosive Sublimate
Cotnion-Methyl™
Counter™
Cov-R-Tox™
Credit™
Crisodrin™
Crisquat™
Crotoxyphos
Crysthion™ Cube Powder™
Cudgel™
Curtail™
Cybolt™
Cycloheximide
Cyclone™
Cyfluthrin
Cypona™

Daconil™
Dagger™
Danitol™
Dart™
DB Straight™
D-CON™
Decrotox™
DEF 6™
Demand CS™
Demeton-S-methyl
Denarin™
Denkavepon™
Detail™
Dibrom™
Dichlorvos
Diclofop-methyl
Dicron™
Dicrotophos
Difenacoum
Difenzoquat methyl sulfate
Dimecron™
Dimefox
Dimepax™
Dinitrophenol
Dinoseb
Dinoseb Acetate
Dinoterb
Dinoterb Acetate
Dioxathion
Diphacin™
Diphacinone
Disulfoton
Disultex™
Di-Syston™
Disyston™
Divipan™
DNOC
Dodemorph Acetate
Dodina™
Dodine
Doom™
Dormex™
Dotan™
DSM™
Duo-Kill™
Duraphos™
Dyfonate™

Echo™
Efuzin™
Ektafos™
Embutone™
Empal™
Endocel™
Endosulfan
Endothion
Endrin
Enzone™
EPN
Ethephon
Ethofumesate
Ethoprop
Ethrel™
Ethyl Dibromide
Ethylene Oxide
Ethylthiodemeton

Fallowmaster™
Farmatox™
Fenamiphos
Fenbutatin-oxide
Fenpropathrin
Fighter™
Finaven™
Flucythrinate
Flumetralin
Fluoroacetamide
Folex™
Folimat™
Forgrow™
Formetanate Hydrochoride
Fortress™
Frigate™
Frumin AL™
Frunax DS Graules™
Fuciram™
Fungiless™
Funginex™
Furadex™

Gallup™
Garlon™
Gazelle™
Geomet™
Glifonox™
Glycel™
Glyfos™
Glyphosate
Glyphotox™
Gramocil™
Gramoxone™
Grandstand™
Granutox™
Grazon™
Gusathion™
Guthion™

Hawk™
Herb-neat™
Herbogil™
Herbolex™
Herboxone™
Hercon™ Vapotape II
Hexazinone
Hiltavax™
Hoelon™
Hydrogen Cyanamide
Hytox™

Icon™
Isoprocarb

Karate™
Keeper™
Kemikar™
Kemiron™
Kilval™
Kinadon™
Kipsin™
Kisvax™
Klerat™
KO-ZINC™

Lactofen
Lambda-cyhalothrin
Landmaster™ BW
Lannate™
Lanox™
Laser™
Lead Arsenate
Lime Sulfur
Lim-N8™
Lo-Dose™
Lontrel™
Lucanal™
Lucaphos™

Madurex™
MAFA
Magic™
Magnacide™ H
Magnesium Phosphide
Marshal™
Marvex Super™
Master™
Matador™
Matikus™

(continues)

Table B-1 Typical Pesticides with Signal Word "Danger"* ***(Continued)***

Matrak™	Osadan™	Ranger™	Sulfuryl Fluoride	Triforine
MCPA	Oxadiazon	Ratak™	Sulgen™	Trifrina™
Mecarbam	Oxamyl	Ratak™ Plus	Suncide™	Trilin™
Medinoterb Acetate		Ratol™	Suncolonil™	Trimaton™
Melprex™	Pamex™	RAX™	Sunfuran™	Triscabol™
MEMA	Paradeep™	Reclaim™	Supex™	Triverdax™
MEMC	Paraphor™	Redentin™	Supona™	Trucidor™
Mercuric Oxide	Paraquat	Remedy™	Supracide™	Tuff Brite™
Merphos	Parathion	Rhomene™	Suprathion™	Turflon™
Metam 426™	Paris Green	Rhonox™	SURpHTAC™	Tycap™
Metam CLR™	Pathfinder™	Rilof™		
Metam-sodium	Payoff™	Rodeo™	Talon™	Ucetam™
Metaphor™	Pestab™	Rodex™	Tam™	Ultracide™
Methamidophos	Phaser™	Ropax™	Tamaron™	Unden™
Methavin™	Phenylmercury Acetate	Rotenone	Tame™	Unicrop™
Methidathion	Phorate	Roundup™	Tech	Unifos™
Methomyl	Phosdrin™	Rozol™	Temik™	Uniquat™
Methyl Bromide	Phosfolan	Rubetram™	Tempo™	Unisan™
Methyl Parathion	Phosphamidon	Rugby™	Tempo™ H	Unite™
Metiltriazotion	Phosvit™		Terborox	
Metolcarb	Pilarfuran™	SAGA™	Terbufos	Vancide™ MZ-96
Mevinphos	Pilarich™	Samourai™	Terrafuran™	Vapam™
Mezene™	Pluck™	Sanacarb™	Terraguard™	Vapona™
MIPC	PMA	Sapecron™	Terr-O-Gas™	Velpar™
Mocap™	Police™	Saprol™	Thallium Sulfate	Venceweed™
Modown™	Posse™	Satecid™	Thalonex™	Vendex™
Monitor™	PQ-8™	Scepter™ O.T.	Thimet™	Venturol™
Monocrotophos	Pramitol™	Scimitar™	Thin-It™	Vikane™
Monophos™	Prenfish™	Scout X-TRA™	Thiofanox	Vitavax™
MTD	Prentox™	Sectagon™	Thionate™	Volid™
	Prime+™	Shotgun™	Thionic™	Volphor™
Naled	Procure™	Sinflouran™	Tomcat™	Vydate L™
Naphthaleneaceta-mide	Prograss™	Sniper™	Toxaphene	
	Prolex™	Sodanit™	Tox-Hid™	Warfarin
Naramycin	Promar™	Sodium Chlorate	Tralex™	Warrior™
Nemacur™	Propaclor	Sodium Cyanide	Tralomethrin	WeatherBlok™
Nico Soap™	Propargite	Sodium Fluoroacetate	Tramat™	Weedless™
Nogos™	Propel™	Sodium Pentachloro-phenate	Transline™	Weedmaster™
Nortron™	Propionic Acid		Treflan™	Wilthin™
Noxfire™	Propogon™	Solfac™	Triazotion	
Noxfish™	Propoxur	Solvirex™	Tribufate	XMC
Nuvacron™	Prosper™	Squadron™	Tribufos	
Nuvalex™	Protocol™	Standak™	Triclopyr	Yeh-Yan-Ku™
	Prozap™	Starfire™	Triflumizole	Yellow Oxide of Mercury
Ole™	Prozap™ MouseMaze™	Steladone™	Trifluralin	
Olitref™		Stinger™	Trifmine™	
Omethoate	Ramik™	Strychnine	Trifocide™	Zinc Phosphide
Omite™	Ramrod™	Suchlor™		Zinc-Tox™
Ornamite™				Ziram

**Farm Chemicals Handbook*, 1997 edition