

NFPA 471

Recommended Practice for Responding to Hazardous Materials Incidents

2002 Edition



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

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NFPA 471

Recommended Practice for Responding to Hazardous Materials Incidents

2002 Edition

This edition of NFPA 471, *Recommended Practice for Responding to Hazardous Materials Incidents*, was prepared by the Technical Committee on Hazardous Materials Response Personnel and acted on by NFPA at its November Association Technical Meeting held November 10–14, 2001, in Dallas, TX. It was issued by the Standards Council on January 11, 2002, with an effective date of January 31, 2002, and supersedes all previous editions.

This edition of NFPA 471 was approved as an American National Standard on January 31, 2002.

Origin and Development of NFPA 471

At the July 1985 NFPA Standards Council meeting, approval was given to the concept of a new project on Hazardous Materials Response Personnel. The Council directed that a proposed scope and start-up roster for the new Committee be prepared, taking into account the need to expand the Committee membership beyond the fire service and the application beyond “professional qualifications.”

The first meeting of the Technical Committee on Hazardous Materials Response Personnel took place in October 1986. The Committee proceeded to develop the first edition of NFPA 471 in conjunction with the first edition of NFPA 472, *Standard on Professional Competence of Responders to Hazardous Materials Incidents*. Both documents were first released as 1989 editions.

Interest in the subject of hazardous materials, especially as it relates to the emergency responder, continued at a high level. Some of this interest was due to an increased awareness of the magnitude of the problem; much of it can be credited to federal regulations in the United States that have had an impact on all responders.

Revisions were made to both NFPA documents in 1992 editions. At the same time the Committee introduced a new related document, NFPA 473, *Standard for Professional Competencies for EMS Personnel Responding to Hazardous Materials Incidents*.

In 1993 the Committee again began reviewing NFPA 471 for the purpose of revising it. The Committee made several changes to the resulting 1997 edition in order to ensure that the document remained consistent with NFPA 472, which had gained wide international acceptance.

The 2002 edition contains additional minor revisions for continued consistency with NFPA 472. Some changes were the result of conformance with the 2000 edition of the NFPA *Manual of Style*.

The gratitude of the Committee is extended to all who participated in the development and review process, and especially to the individuals not on the Committee who helped so much.

The Committee would like to dedicate this recommended practice to the fallen heroes of the terrorist attack of September 11, 2001. Many lives were saved because of their efforts. These individuals gave the ultimate sacrifice in the line of duty and stand alone in their bravery and dedication to their jobs and their country. Our thoughts and prayers are with their families, friends, and co-workers. Let us never forget these brave individuals and the other emergency responders who have died in the line of duty. The Committee especially wishes to honor Committee member John J. Fanning, FDNY, who died in the line of duty on September 11.

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Committee Scope: This Committee shall have primary responsibility for documents on the requirements for the professional competence, training, procedures, and equipment for emergency responders to hazardous materials incidents.

This list represents the membership at the time the Committee was balloted on the final text of this edition. Since that time, changes in the membership may have occurred. A key to classifications is found at the back of the document.

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.

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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.

A reference in brackets [] following a section or paragraph indicates material that has been extracted from another NFPA document. As an aid to the user, Annex D lists the complete title and edition of the source documents for both mandatory and nonmandatory extracts. Editorial changes to extracted material consist of revising references to an appropriate division in this document or the inclusion of the document number with the division number when the reference is to the original document. Requests for interpretations or revisions of extracted text shall be sent to the appropriate technical committee.

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

Chapter 1 Administration

1.1* Scope. This recommended practice applies to all organizations that have responsibilities when responding to hazardous materials incidents and recommends standard operating guidelines for responding to such incidents. Planning procedures, policies, and application of procedures for incident levels, personal protective equipment, decontamination, safety, and communications are specifically covered in this recommended practice.

1.2 Purpose. The purpose of this document is to outline the minimum requirements that should be considered when dealing with responses to hazardous materials incidents and to specify operating guidelines for responding to hazardous materials incidents. It is not the intent of this recommended practice to restrict any jurisdiction from using more stringent guidelines.

1.3 Application. The recommendations contained in this document should be followed by organizations that respond to hazardous materials incidents and by incident commanders responsible for managing hazardous materials incidents.

Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this recommended practice and should be considered part of the recommendations of this document.

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

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

NFPA 472, *Standard for Professional Competence of Responders to Hazardous Materials Incidents*, 2002 edition.

NFPA 473, *Standard for Competencies for EMS Personnel Responding to Hazardous Materials Incidents*, 2002 edition.

NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*, 2002 edition.

NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus for the Fire Service*, 1997 edition.

NFPA 1982, *Standard on Personal Alert Safety Systems (PASS)*, 1998 edition.

NFPA 1991, *Standard on Vapor-Protective Ensembles for Hazardous Materials Emergencies*, 2000 edition.

NFPA 1992, *Standard on Liquid Splash-Protective Ensembles and Clothing for Hazardous Materials Emergencies*, 2000 edition.

2.3 Other Publications.

2.3.1 ASTM Publications. American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM F 716, *Method of Testing Sorbent Performance of Absorbents*, 1993.

ASTM F 726, *Method of Testing Sorbent Performance of Adsorbents*, 1999.

2.3.2 U.S. Government Publication. U.S. Government Printing Office, Superintendent of Documents, Washington, DC 20402.

Title 29, *Code of Federal Regulations*, Part 1910.120.

Title 40, *Code of Federal Regulations*, Part 311.

Title 42, *United States Code*, Chapter 116.

Chapter 3 Definitions

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

3.2 NFPA Official Definitions.

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

3.2.2 Recommended Practice. A document that is similar in content and structure to a code or standard but that contains only nonmandatory provisions using the word “should” to indicate recommendations in the body of the text.

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

3.3 General Definitions.

3.3.1* Absorption. The process in which materials hold liquids through the process of wetting.

3.3.2* Adsorption. The process in which a sorbate (hazardous liquid) interacts with a solid sorbent surface.

3.3.3 Confinement. Those procedures taken to keep a material, once released, in a defined or local area.

3.3.4 Containment. The actions taken to keep a material in its container (e.g., stop a release of the material or reduce the amount being released).

3.3.5 Contaminant. A hazardous material that physically remains on or in people, animals, the environment, or equipment, thereby creating a continuing risk of direct injury or a risk of exposure. [472:3.3]

3.3.6 Contamination. The process of transferring a hazardous material from its source to people, animals, the environment, or equipment, which may act as a carrier.

3.3.6.1 Secondary Contamination. The process by which a contaminant is carried out of the hot zone and contaminates people, animals, the environment, or equipment. [472:3.3]

3.3.7 Control. The procedures, techniques, and methods used in the mitigation of a hazardous materials incident, including containment, extinguishment, and confinement. [472:3.3]

3.3.8* Control Zones. The areas at a hazardous materials incident that are designated based upon safety and the degree of hazard.

3.3.9 Decontamination (Contamination Reduction). The physical and/or chemical process of reducing and preventing the spread of contamination from persons and equipment used at a hazardous materials incident.

3.3.9.1 Emergency Decontamination. The physical process of immediately reducing contamination of individuals in potentially life-threatening situations with or without the formal establishment of a decontamination corridor. [472:3.3]

3.3.9.2* Gross Decontamination. The initial phase of the decontamination process during which the amount of surface contaminant is significantly reduced.

3.3.10 Decontamination Corridor. The area usually located within the warm zone where decontamination procedures take place. [472:3.3]

3.3.11 Degradation. (a) A chemical action involving the molecular breakdown of a protective clothing material or equipment due to contact with a chemical. (b) The molecular breakdown of the spilled or released material to render it less hazardous during control operations.

3.3.12* Disinfection. The process used to destroy recognized pathogenic microorganisms.

3.3.13 Emergency. A fire, explosion, or hazardous condition that poses an immediate threat to the safety of life or damage to property. [1:2-1]

3.3.14 Environmental Hazard. A condition capable of posing an unreasonable risk to air, water, or soil quality and to plants or wildlife.

3.3.15* Exposure. The process by which people, animals, the environment, and equipment are subjected to or come in contact with a hazardous material. [472:3.3]

3.3.16 Hazard/Hazardous. Capable of posing an unreasonable risk to health, safety, or the environment; capable of causing harm.

3.3.17* Hazard Sector. That function within an overall incident management system that deals with the mitigation of a hazardous materials incident.

3.3.18 Hazardous Materials Sector Officer. The person responsible for the management of the hazard sector.

3.3.19* Hazardous Material. A substance (solid, liquid, or gas) that when released is capable of creating harm to people, the environment, and property. [472:3.3]

3.3.20 Incident. An emergency involving the release or potential release of a hazardous material, with or without fire. [295:1.3]

3.3.21* Incident Commander. The person who is responsible for all decisions relating to the management of the incident and is in charge of the incident site. [472:3.3]

3.3.22* Incident Management System. An organized system of roles, responsibilities, and standard operating procedures used to manage and direct emergency operations. [1021:1.4]

3.3.23 Mitigation. Actions taken to prevent or reduce product loss, human injury or death, environmental damage, and property damage due to the release or potential release of hazardous materials.

3.3.24 Monitoring Equipment. Instruments and devices used to identify and quantify contaminants.

3.3.25* National Contingency Plan. Policies and procedures of the federal agency members of the National Oil and Hazardous Materials Response Team.

3.3.26 Neutralization. The process of applying acids or bases to a corrosive product to form a neutral salt.

3.3.27 Penetration. The movement of a material through a suit's closures, such as zippers, buttonholes, seams, flaps, or other design features of chemical-protective clothing, and through punctures, cuts, and tears.

3.3.28 Permeation. A chemical action involving the movement of chemicals, on a molecular level, through intact material.

3.3.29* Protective Clothing. Equipment designed to protect the wearer from heat and/or hazardous materials contacting the skin or eyes. [472:3.3]

3.3.30* Response. That portion of incident management in which personnel are involved in controlling (defensively or offensively) a hazardous materials incident.

3.3.31 Sampling. The process of collecting a representative amount of gas, liquid, or solid for analytical purposes.

3.3.32 Solidification. The process whereby a hazardous liquid is treated chemically so that solid material results.

3.3.33 Stabilization. The point in an incident at which the adverse behavior of the hazardous material is controlled.

3.3.34 Sterilization. The process of destroying all microorganisms in or on an object.

3.3.35 Waste Minimization. Treatment of hazardous spills by procedures or chemicals designed to reduce the hazardous nature of the material and to minimize the quantity of waste produced.

Chapter 4 Incident Response Planning

4.1 Developing an Incident Response Plan.

4.1.1 Planning is an essential part of emergency preparedness. The development of both facility response plans and

community emergency plans is required by numerous state and federal laws, including Superfund Amendments and Reauthorization Act (SARA), Title III, “The Emergency Planning and Community Right to Know Act of 1986” in 42 USC 116. Planning guides and reference materials are listed in Annex B.

4.1.2 A planning team is necessary for developing the hazardous materials emergency plan. Local, state, and federal planning guidelines should be reviewed and consulted by the planning team when preparing plans for hazardous materials incidents.

4.2 Review and Training.

4.2.1 As a minimum, an annual review and update of the hazardous materials emergency plan should be conducted.

4.2.2 As a minimum, a training exercise should be conducted annually to determine the adequacy and effectiveness of the hazardous materials emergency plan.

Chapter 5 Response Levels

5.1* Planning Guide. Table 5.1 is a planning guide intended to assist the user in determining incident levels for response and training.

5.2 Potential Applications. Potential applications to a jurisdiction’s response activities can include development of standard operating procedures; implementation of a training program using the competency levels of NFPA 472, *Standard for Professional Competence of Responders to Hazardous Materials Incidents*; acquisition of necessary equipment; and development of community emergency response plans. When consulting this table, the user should refer to all of the incident condition criteria to determine the appropriate incident level.

Table 5.1 Planning Guide for Determining Incident Levels for Response and Training

Incident Conditions	Incident Level		
	One	Two	Three
Product identifications	Placard not required, NFPA 0 or 1 all categories, all Class 9 and ORM-D	DOT placarded, NFPA 2 for any categories, PCBs without fire, EPA regulated waste	Class 2, Division 2.3—poisonous gases, Class 1, Division 1.1 and 1.2—explosives, organic peroxide, flammable solid, materials dangerous when wet, chlorine, fluorine, anhydrous ammonia, radioactive materials, NFPA 3 & 4 for any categories including special hazards, PCBs & fire, DOT inhalation hazard, EPA extremely hazardous substances, and cryogenics
Container size	Small [e.g., pail, drums, cylinders except 910-kg (1-ton), packages, bags]	Medium [e.g., 910-kg (1-ton) cylinders, portable containers, nurse tanks, multiple small packages]	Large (e.g., tank cars, tank trucks, stationary tanks, hopper cars/trucks, multiple medium containers)
Fire/explosion potential	Low	Medium	High
Leak severity	No release or small release contained or confined with readily available resources	Release may not be controllable without special resources	Release may not be controllable even with special resources
Life safety	No life-threatening situation from materials involved	Localized area, limited evacuation area	Large area, mass evacuation area
Environmental impact (potential)	Minimal	Moderate	Severe
Container integrity	Not damaged	Damaged but able to contain the contents to allow handling or transfer of product	Damaged to such an extent that catastrophic rupture is possible