

SUPPLEMENT 6

Response Levels

Editor's Note: This supplement is taken from the 2002 edition of this handbook. In that handbook, the full text of the 2002 edition of NFPA 471, *Recommended Practice for Responding to Hazardous Materials Incidents*, was included. Since then, NFPA 471 has been withdrawn. This supplement is a reprint of Chapter 5, including both the standard and commentary text. All text is now considered commentary text, as the standard no longer exists. The material can still be useful to the reader, so it is included as a supplement in this handbook.

This supplement can be used as a guide for determining the appropriate response levels based on the nature of a hazardous materials/weapons of mass destruction (WMD) incident. Three types of incidents and levels are discussed, along with classes of hazardous materials.

Table S6.1 can be used as a planning guide to assist the user in determining incident levels for response and training. Some response organizations have established a “tiered response plan” to match the response levels listed in Table S6.1. In many cases, the classification of an incident is the responsibility of the emergency call taker. Detailed training is necessary for call takers to make an accurate classification.

As a general guideline, there are three types or levels of incidents: Level 1, Level 2, and Level 3. These levels can be defined as follows:

- **Level 1.** An incident involving hazardous materials that can be contained, extinguished, and/or abated using resources immediately available to the public sector responders having jurisdiction. Level 1 incidents present little risk to the environment and/or to public health with containment and cleanup.
- **Level 2.** An incident involving hazardous materials that is beyond the capabilities of the first responders on the scene and could be beyond the capabilities of the public sector responders having jurisdiction. Level 2 incidents might require the services of a state or regional response team or other state or federal assistance. This level can pose immediate and long-term risk to the environment and public health.

- **Level 3.** An incident involving hazardous materials that is beyond the capabilities of a single state or regional response team and requires additional assistance. Level 3 incidents can require resources from state and federal agencies and private industry. These incidents generally pose extreme, immediate, and/or long-term risk to the environment and public health.

The initial responders to the scene should be alert to signs that hazardous materials are involved. Some signs, such as truck placards, are obvious. Other indications of the presence of hazardous materials can be observed in the type of location of the incident, such as an industrial site, a service station, or a licensed or unlicensed business location. Once the location has been established, then the types of materials normally associated with that type of occupancy, what substances can be present, and in what quantities can be determined.

For example, if the incident is at an unlicensed auto body shop, paints, solvents, and other flammable and combustible liquids are likely to be present but not in the same quantity as would be expected in a larger, licensed facility with the ability for bulk storage. Unlicensed or illegal businesses using hazardous materials are probably not in compliance with any of the local regulations for equipment maintenance, hazardous materials storage, record keeping, or disposal.

First responders to any incident need to be aware of their limitations. For example, if a reported incident is classified as a Level 1 condition, initial responding units should be able to handle it or, after evaluation, call for

TABLE S6.1 Planning Guide for Determining Incident Levels for Response and Training Incident Level

<i>Incident Conditions</i>	<i>Incident Level One</i>	<i>Incident Level Two</i>	<i>Incident Level Three</i>
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 1-ton (910 kg), packages, bags]	Medium [e.g., 1-ton (910 kg) 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

additional resources. A Level 2 incident requires greater response capability, and a Level 3 incident needs even more sophisticated equipment and highly trained personnel. Level 2 and Level 3 responses can be served by a regional or nearby mutual aid hazardous materials team. When planning for potential hazardous materials incidents, the planning body should address incidents at all levels to ensure a smooth response coordination.

Some of the terms and conditions in Table S6.1 warrant explanation, and much of the remainder of this supplement provides information about some of the terms in the table. For example, *Placard Not Required* is a term that refers to U.S. Department of Transportation (DOT) regulations. However, the absence of a placard should not be taken as an assurance that the contents are harmless.

The term *NFPA 0 or 1 All Categories* is a reference to NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response* [1]. NFPA

704 deals with a labeling system, as shown in Exhibit S6.1, that advises on the following three hazard conditions:

- Health
- Flammability
- Reactivity

The five degrees of intensity range from 0 to 4. A 0 or a 1 in all three hazard conditions indicates a relatively low hazard. The following terms also require explanation:

Class 9 (previously identified by the DOT as ORM A, B, and C) and ORM-D: ORM means other regulated materials. Examples of Class 9 materials include adipic acid, hazardous substances such as polychlorinated biphenyls (PCBs), and molten sulfur.

Class 9 Miscellaneous: Examples include miscellaneous hazardous materials, that is, those materials, including the following, that present a hazard during transport but are not included in another hazard class:

Adhesive-backed plastic background pieces; one needed for each numeral, three needed for each complete hazard rating

(a) For use where specified color background is used with numerals of contrasting colors

Flammability hazard rating — red
Health hazard rating — blue
Instability hazard rating — yellow

(b) For use where white background is necessary

White painted background or white paper or card stock

(c) For use where white background is used with painted numerals or for use when hazard rating is in the form of sign or placard

EXHIBIT S6.1 The alternate arrangements for display of NFPA 704 Hazard Identification System provide responders with information on the three hazard conditions. [Source: NFPA 704, 2007 ed., Figure 9.1(a)]

- Any material that has an anesthetic, noxious, or similar property that could cause a flight crew such annoyance or discomfort as to prevent them from correctly performing their assigned duties
- Any material, such as a hazardous substance or a hazardous waste, that is not included in any other hazard class but is subject to the DOT requirements

ORM-D Material: A material that presents a limited hazard during transportation due to its form, quantity, and packaging. Examples of ORM-D materials include consumer commodities and small arms ammunition.

PCBs Without Fire: Even without the added hazard of fire, PCBs that are sufficiently harmful to responders to warrant a Level 2 condition. PCBs present serious health threats to skin and the liver.

EPA Regulated Waste: A list of waste regulated by the EPA can be found in Title 40, Code of Federal Regulations, Part 261 [2]. The two classes of EPA regulated wastes are as follows:

- Class 1, Division 1.1 and 1.2 — Explosives. Examples of Division 1.1 are dynamite and black powder. Examples of Division 1.2 are propellant explosives and rocket motors. Prior to 1991, this class was classified as Explosives A or B.
- Class 2, Division 2.3 — Poisonous Gases. Examples are arsine, hydrocyanic acid, and phosgene. These are extremely dangerous poisons. Prior to 1991, this class was classified as Poison A.

Organic Peroxide: Organic peroxides that can be highly flammable and most decompose readily when heated. In some cases, the decomposition can be violent.

Flammable Solid: Examples are pyroxylin plastics, magnesium, and aluminum powder.

Materials Dangerous When Wet: A category that includes sodium and potassium metals and calcium.

Chlorine: A greenish yellow gas that is highly toxic and irritating.

Fluorine: An extremely reactive and intensely poisonous yellow gas.

Anhydrous Ammonia: A very toxic and corrosive gas.

Radioactive Materials: Materials that spontaneously emit ionizing radiation having a specific activity greater than 0.002 microcurie per gram.

DOT Inhalation Hazard: Inhalation hazards that are measured in terms of TLV/TWA (threshold limit value/time-weighted average). Shipping papers must indicate the inhalation hazard, and containers must be marked “Inhalation Hazard.” Vehicles are placarded “Poison” or “Poison Gas” in addition to the primary hazard listing requirements.

EPA Extremely Hazardous Substances: A list of 366 such substances published by the EPA that can be found at www.epa.gov/swercepp/ehs/ehsalph.html.

Cryogenics: Extremely cold liquified gases [200°F (129°C)] that can cause severe damage to skin or other body parts.

Container Size: The larger the container, the greater the potential for risk, hence the increase in the level of incident condition. The condition of the container itself can also influence the level of the incident. An example of poor container condition can be seen in Exhibit S6.2. Poorly contained wastes can mix with each other, forming new



EXHIBIT S6.2 Hazardous wastes can be found stored in containers, such as these barrels, that are corroded, lack appropriate identification labels, and are in poor condition.

compounds that are more unstable or toxic than the original components.

Fire/Explosion Potential: The assumption in each case that the incident is not simply a fire but that some hazardous material is involved. Where fire is not present, Level 1 might be appropriate, depending on other prevailing conditions. If a container is involved in fire, Level 3 might be more appropriate. A fire involving a container can be conceivably handled safely by a responding fire department without the assistance of any hazardous materials response personnel. Nonetheless, appropriate authorities have to be notified and alerted to the situation. A vitally important factor to keep in mind is that containers involved in fire can overpressurize and explode, which is especially true of hazardous materials in liquid form stored in tanks and other larger and smaller containers. The explosion can spread hazardous material over a large geographic area as well as spread fire and chemical gases. Thus, every precaution must be taken when approaching containers that are exposed to fire. For the maximum protection of all individuals, the planning committee should address the possibility of fire in each of their hazardous materials response plans.

Leak Severity: The extent of the leak and the likelihood that it can be controlled. The selection of levels obviously depends on this information.

Life Safety: The number of people potentially exposed. This criterion is a major determining factor in selecting the appropriate level.

Environmental Impact: The terms *minimal*, *moderate*, and *severe* are general. Judgment is required, and experts should be consulted. The environmental impacts of an incident might not be known at the start of the incident, and they are frequently more severe than anticipated.

Container Integrity: Extreme care must be taken

with damaged containers before allowing them to be transferred. Once with environmental impact, experts in this field should be consulted. If doubt exists, the incident should be considered as Level 3.

Incidents involving damaged containers can be considered as requiring either offensive or defensive operations.

Offensive operations include actions taken by a hazardous materials responder, in appropriate chemical-protective clothing, to handle an incident in such a manner that contact with the released material might result. These actions include patching or plugging to slow or stop a leak; containing a material in its own package or container; and cleanup operations that could require overpacking or transfer of a product to another container.

Defensive operations include actions taken during an incident where there is no intentional contact with the material involved. These actions include elimination of ignition sources, vapor suppression, and diking or diverting to keep a release in a confined area. Defensive operations require notification and possible evacuation, but they do not involve plugging, patching, or cleanup of spilled or leaking materials.

Jurisdictions are responsible for developing standard operating procedures that equate levels of response to levels of training indicated in NFPA 472, *Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents*. Depending on the capabilities and training of personnel, the first responder operational level can equate to incident level one and the technician level may equate to incident level two.

Response personnel should operate only at the incident level that matches their knowledge, training, and equipment. If conditions indicate a need for a higher response level, additional personnel, appropriate training, and equipment should be summoned.

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, acquisition of necessary equipment, and development of community emergency response plans. When consulting Table S6.1, the user should refer to all of the incident condition criteria to determine the appropriate incident level.

REFERENCES

1. NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response*, National Fire Protection Association, Quincy, MA, 2007.
2. Title 40, Code of Federal Regulations, Part 261, U.S. Government Printing Office, Washington, DC, July 1, 2001.