

**Return to
Manual**

**Table 6-1
NFPA 471. Recommended Practice for
Responding to Hazardous Materials Incidents¹
- Minimum Requirements Applicable to Fairfax County OHSP -**

Incident Response Planning

Developing an Incident Response Plan

- Development of both facility response plans and community emergency plans is required by Federal and state laws (i.e., Superfund Amendments and Reauthorization Act {SARA} Title III; Emergency Planning & Community Right to Know Act of 1986). Planning team is necessary for developing hazardous materials emergency plan. Local, state, and Federal planning guidelines should be reviewed by the planning team when preparing plans for hazardous materials.

Review and Training

- Review and update hazardous materials emergency plan *at least* annually.
- Conduct annual training exercise to determine the adequacy and effectiveness of hazardous materials emergency plan.

¹It should be noted that the Fairfax County Fire and Rescue Department has a dedicated “Hazardous Materials Response Team” who, for the most part, are responsible for mitigation of any emergency involving hazardous materials in the County. This specialized, highly trained team remains abreast of compliance issues directed specifically at hazardous materials response. Information provided in this Plan is intended for use by all uniformed fire and rescue personnel who may, at times, be involved in situations involving hazardous materials. It is not intended as a full summary of all requirements/recommendations set forth in NFPA 471.

**Return to
Manual**

**Table 6-1
NFPA 471. Recommended Practice for
Responding to Hazardous Materials Incidents
- Minimum Requirements Applicable to Fairfax County OHSP -**

Response Levels

Planning Guide

- NFPA 471 includes a planning guide intended to provide assistance in determining incident level for response and training. Responsibility for this action lies with the County's Hazardous Response Team.
- Uniformed fire and rescue personnel should be familiar with current community response plan.

Site Safety

Emergency Incident Operations

- Incident management system should be implemented at all hazardous materials incidents. Operations are to be directed by designated incident commander. Operations should follow established written standard operating procedures.
- Incident management plan should include: standard personnel identification system to maintain accountability for each member engaged in activities at incident scene; standard operating procedure to evacuate personnel from an area where an imminent hazard condition is found to exist and account for the safety of personnel. System should include a method to immediately notify all personnel in the affected area of an imminent hazard condition by means of audible warning devices.
- Incident commander should make provisions for rest and rehabilitation for members operating at the scene. Considerations should include medical evaluation and treatment, food and fluid, replenishment, and relief from extreme climatic conditions.
- Emergency response plan describing general safety procedures to be followed at an incident should be prepared in accordance with 29 CFR 1910.120. Procedures should be thoroughly reviewed and tested.

Return to
Manual

Table 6-1
NFPA 471. Recommended Practice for
Responding to Hazardous Materials Incidents
- Minimum Requirements Applicable to Fairfax County OHSP -

Site Safety (continued)

Ignition Sources

- Ignition sources should be eliminated whenever possible at incidents involving releases, or probable releases. When possible, electrical devices used within the “hot zone” should be certified as intrinsically safe by recognized organizations.

Control Zones

- Control zone names should be consistently applied at incidents. NFPA 471 specifications are: **Hot Zone:** Area immediately surrounding a hazardous materials incident, extending far enough to prevent adverse effects from hazardous materials releases to personnel outside the zone. This zone is also referred to as the **exclusion zone** or **restricted zone** in other documents. **Warm Zone:** Area where personnel and equipment decontamination and hot zone support take place. Includes control points for the access corridor and thus assists in reducing the spread of contamination. This zone is also referred to as the **decontamination, contamination reduction,** or **limited access zone** in other documents. **Cold Zone:** Contains the command post and such other support functions as are deemed necessary to control the incident. This zone is also referred to as the **clean zone** or **support zone** in other documents.

Communications

- Effective means of communication (such as radios) should be established when personal protective equipment or remote operations inhibit communications. Frequencies employed in these radios should be “dedicated” and not used or shared with other local agencies

**Return to
Manual**

**Table 6-1
NFPA 471. Recommended Practice for
Responding to Hazardous Materials Incidents
- Minimum Requirements Applicable to Fairfax County OHSP -**

Monitoring Equipment

- All monitoring equipment should be operationally checked prior to use and periodically calibrated in accordance with manufacturer's specifications.

Personal Protective Equipment

- It is essential that all personal protective equipment (PPE) meeting appropriate NFPA and OSHA standards be provided, maintained, and used. Protection against physical, chemical, and thermal hazards should be considered when selecting PPE.
- A written personal protective equipment program should be established in accordance with 29 CFR 1910.120. Program elements should include: PPE selection and use; storage, maintenance and inspections procedures; and training considerations.

Respiratory Protective Equipment

- SCBA should meet requirements of NFPA 1981 (*Open-Circuit Self-Contained Breathing Apparatus for Fire Fighters*). Personal alert safety systems should meet requirements of NFPA 1982 (*Personal Alert Safety Systems for Fire Fighters*).
- Air purifying respirators should be worn only in atmospheres where the type and quantity of the contaminants are known and sufficient oxygen is known to be present.

**Return to
Manual**

**Table 6-1
NFPA 471. Recommended Practice for
Responding to Hazardous Materials Incidents
- Minimum Requirements Applicable to Fairfax County OHSP -**

Chemical-Protective Clothing

- Performance requirements should be considered in selection of appropriate chemical-protective material. Requirement include: chemical resistance, permeation, penetration, flexibility, abrasion, temperature resistance, shelf life, and sizing criteria.

Thermal Protection

- Five pieces of protective equipment outlined for use: Proximity suit - provides short-duration and close proximity protection at radiant heat temperatures as high as 2,000⁰F. Respiratory protection needs to be provided with proximity suits; Fire entry suits - provide protection for brief entry into a total flame environment at temperatures as high as 2,000⁰F. Not effective or meant to be used for rescue operations; Overprotection garments - worn in conjunction with chemical-protective encapsulating suits; Flash cover protective suits - provide limited overprotection against flashback only. Worn outside other protective suits and used only when risks require them; Low temperature suits - provide some degree of protection of encapsulating chemical-protective clothing from contact with low temperature gases and liquids. Worn outside other protective suits and used only when risks require them.

Levels of Protection

- PPE is divided into four categories based on degree of protection afforded: Level A = greatest level of skin, respiratory, and eye protection required; Level B = highest level of respiratory protection necessary but lesser level of skin protection needed; Level C = used when concentration(s) and type(s) of airborne substance(s) is known and criteria for using air purifying respirators are met; Level D = work uniform providing minimal protection. Used for nuisance contamination only.

**Return to
Manual**

**Table 6-1
NFPA 471. Recommended Practice for
Responding to Hazardous Materials Incidents
- Minimum Requirements Applicable to Fairfax County OHSP -**

Decontamination

Decontamination Plan

- Entire process of decontamination should be directed toward confinement of the contaminant within the hot zone and the decontamination corridor to maintain the safety and health of response personnel, the general public, and the environment. Sound judgement should be exercised and the potential effects of the decontamination process upon personnel should be considered when developing the decontamination plan.
- Decontamination is typically performed following site entry; however, determination of proper decontamination methods and procedures should be considered before the incident as part of the overall pre-incident planning and hazard and risk evaluation process. No entry into the hot zone should be permitted until appropriate decontamination methods are determined and established based on the hazards present, except in situations where a rescue may be possible and emergency decontamination is available.
- Emergency response personnel should have an established procedure to minimize contamination or contact, to limit migration of contaminants, and to properly dispose of contaminated materials. The primary objective of decontamination is to avoid becoming contaminated or contaminating other personnel or equipment outside the hot zone. If contamination is suspected, decontamination of personnel, equipment, and apparatus should be performed.

Decontamination

- Decontamination procedures for all phases need to be developed and implemented to reduce the possibility of contamination to personnel and equipment. Initial procedures should be upgraded or downgraded as additional information is obtained concerning the type of hazardous materials involved, the degree of hazard, and the probability of exposure of response personnel.

**Return to
Manual**

**Table 6-1
NFPA 471. Recommended Practice for
Responding to Hazardous Materials Incidents
- Minimum Requirements Applicable to Fairfax County OHSP -**

Decontamination (Continued)

- Decision(s) to implement all or part of a decontamination procedure should be based upon a field analysis of the hazards and risks involved. Analysis generally consists of referring to technical reference sources to determine the general hazards such as flammability and toxicity, and then evaluating the relative risks. Decontamination procedures should: be implemented upon arrival at the scene; provide an adequate number of decontamination stations and personnel; and continue until the incident commander determines that decontamination procedures are no longer required.
- On occasion, an apparently normal alarm response turn into a hazardous materials incident and initial assignment crews may have entered the incident area and exposed themselves to the contamination threat. All members so involved should remove themselves from the area at once, call for decontamination capability, and stay together in one location.
- Personnel so exposed should be given gross decontamination as a precautionary measure. Knowledgeable hazardous materials personnel, such as the decontamination sector officer, in conjunction with the incident commander, should determine whether more definitive decontamination is necessary. The primary objective of decontamination is to avoid contaminating anyone or anything beyond the hot zone. When in doubt about contamination, decontaminate all involved personnel, equipment, and apparatus.

Decontamination Methods

- **Physical methods** - generally involve physical removal of the contaminant from the contaminated person or object and containment of the contaminant for appropriate disposal. While these methods can reduce the contaminant's concentration, generally the containment remains chemically unchanged. Examples of physical decontamination methods include: absorption, brushing and scraping, isolation and disposal, vacuuming, and washing.

Return to
Manual

Table 6-1
NFPA 471. Recommended Practice for
Responding to Hazardous Materials Incidents
- Minimum Requirements Applicable to Fairfax County OHSP -

Decontamination Methods (Continued)

- **Chemical methods** - used on equipment, not people, and generally involve decontamination by changing the contaminant through some type of chemical reaction in an effort to render the contaminant less harmful. Examples of chemical methods include: adsorption, chemical degradation, disinfection or sterilization, neutralization, and solidification.
- **Prevention Methods** - if contact with a contaminant can be controlled, the risk of exposure is reduced and the need for decontamination minimized. Recommendations to prevent contamination include: (1) Stress work practices that minimize contact with hazardous substances; (2) Wear limited-use or disposable protective clothing and equipment, where appropriate.

Decontaminating Personal Protective Equipment (PPE)

- PPE should be removed in a manner such that the outside surfaces do not touch or make contact with the wearer.
- A log of PPE used during the incident should be maintained.
- Personnel wearing disposable PPE should proceed through the decontamination process setup in the decontamination area. Disposable PPE should be containerized and identified for disposal in accordance with established procedures.
- Physical and chemical compatibility of decontamination solutions should be determined before they are used. Any decontamination method that permeates, degrades, damages, or otherwise impairs the safe function of PPE should not be used unless there are plans to isolate and dispose of the PPE.
- Water or other solutions for washing or rinsing may have to be confined, collected, containerized, and analyzed for proper treatment and disposal. Consult with environmental and public health agencies or other appropriate reference sources and guidelines to determine the need for confinement and the appropriate disposal methods for collected decontamination fluids and PPE.

**Return to
Manual**

**Table 6-1
NFPA 471. Recommended Practice for
Responding to Hazardous Materials Incidents
- Minimum Requirements Applicable to Fairfax County OHSP -**

Decontaminating Personal Protective Equipment (PPE) (Continued)

- Decontamination methods vary in effectiveness. The effectiveness of any decontamination method should be assessed throughout the decontamination operation. If decontamination does not appear to be effective, a different method should be selected and implemented.
- If personnel display any symptoms of heat exhaustion or possible exposure, appropriate emergency measures need to be implemented to doff PPE while protecting the individual from contaminants and preventing the spread of any contaminants. Individuals should be transferred to the care of emergency medical services personnel who have completed training in accordance with applicable standards (NFPA 473, *Competencies for EMS Personnel Responding to Hazardous Materials Incidents*).
- A debriefing should be held for those involved in decontamination as soon as practical. Exposed persons should be provided with as much information as possible about the delayed health effects of the hazardous materials involved in the incident. If necessary, follow-up examinations should be scheduled with medical personnel.
- Exposure records should be maintained for future reference by the physician(s) and employer.

Medical Monitoring

- Medical monitoring is performed at the site of a hazardous materials incident to: obtain baseline vital signs and physical assessment; identify and preclude from participation in the hot and warm zone activities individuals at increased risk for sustaining injury and illness as a result of on-scene activities; and provide early recognition and treatment of personnel with adverse physiological responses as a result of on-scene activities.

**Return to
Manual**

**Table 6-1
NFPA 471. Recommended Practice for
Responding to Hazardous Materials Incidents
- Minimum Requirements Applicable to Fairfax County OHSP -**

Medical Monitoring (Continued)

- Pre-entry medical monitoring should be completed on all individuals wearing chemical liquid splash- and vapor protective clothing and performing hazardous materials operations. This should be completed within one hour prior to entry.

Components of Pre-Entrance Medical Monitoring

- Weight and Vital signs: blood pressure, pulse, respiratory rate, temperature, and EKG rhythm strip (10 sec) if available.
- Skin examination for rashes or open sores/wounds
- Mental status: individual should be alert and oriented to time and place, have clear speech and a normal gait, and be able to respond appropriately to the situation.
- Medical history: over-the-counter medications taken within past 72 hours; alcohol consumption within past 24 hours; any new medical treatment or diagnosis made within the past two weeks; symptoms of fever, nausea, vomiting, diarrhea or cough within the past 72 hours.
- Hydration: determine whether the individual has consumed 816 ounces of water or diluted activity drink.

Exclusion Criteria

- The following exclusion criteria should be applied to findings of all medical monitoring completed on hazardous materials response personnel. Criteria provide EMS Control Officer and Hazardous Materials Branch Officer guidelines to determine medical/physical fitness for entry:
 - (a) Blood pressure: diastolic > 105 mm Hg
 - (b) Pulse - > 70 percent maximum heart rate (220 -age)

**Return to
Manual**

**Table 6-1
NFPA 471. Recommended Practice for
Responding to Hazardous Materials Incidents
- Minimum Requirements Applicable to Fairfax County OHSP -**

Exclusion Criteria (Continued)

- © Respiratory rate - > 24 per minute
- (d) Temperature - > 99.5°F or < 97.0°F (oral); > 100.5°F or < 98.0°F (core)
- (e) Weight - no pre-entry exclusion
- (f) EKG - dysrhythmia not previously detected (must be cleared by medical control)
- (g) Skin evaluation - open sores, large area of rash or significant sunburn
- (h) Mental status - altered mental status (i.e., slurred speech, clumsiness, weakness)
- (l) Recent medical history - (1) presence of nausea, vomiting diarrhea, fever, upper respiratory infection, heat illness, or heavy alcohol intake withing past 72 hours, all of which contribute to dehydration. (2) new prescription medications taken within past two weeks or over the counter meds such as cold, flue or allergy medicines, taken within pas 72 hours (must be cleared through local medical control or hazardous materials medical director). (3) any alcohol within past six hours. (4) pregnancy.

Post-Entry Medical Monitoring

- Post-entry medical monitoring is performed to determine: whether an individual has suffered any immediate effects from exposure to a hazardous material or the environment; an individual's health status for future assignment during or following incident (this assessment should include physiological and psychological considerations).
- Post-entry medical monitoring should include: history (any symptom of hazardous material exposure, environmental exposure, or cardiovascular collapse; vital signs (b.p., pulse, respiratory rate, temp, EKG (if available), weight, skin evaluation, and mental status.

**Return to
Manual**

**Table 6-1
NFPA 471. Recommended Practice for
Responding to Hazardous Materials Incidents
- Minimum Requirements Applicable to Fairfax County OHSP -**

Post-Medical Monitoring Follow-Up

- Post-medical monitoring follow-up should include: (1) repeat monitoring of vital signs every 5-10 minutes until they return to less than 85 percent of maximum pulse rate. If at 10 minutes the signs have not returned to within 10 percent of baseline, perform orthostatic vital signs; (2) determine from medical control what information regarding latent reactions/symptoms should be communicated to response personnel; (3) if any of the following symptoms are present, contact medical control for direction and preparation for possible transport to a medical facility:
 - Body weight loss of greater than 3 percent or positive orthostatic (pulse increase by 20 beats per minute or systolic blood pressure decrease by 20 mm of Hg at two minutes standing).
 - Greater than 85 percent maximum pulse at 10 minutes
 - Temperature greater than 101⁰F (oral) or 102⁰F (core)
 - Nausea, vomiting, diarrhea, altered mental status, or respiratory, cardiac, or dermatologic complaints.