



INCIDENT COMMAND SYSTEM PUBLICATION

**GUIDELINES FOR RAPID EXTRACTION
IN HAZARDOUS MATERIAL ENVIRONMENTS**

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This document contains information relative to the Incident Command System (ICS) component of the National Incident Management System (NIMS). This is the same Incident Command System developed by FIREScope.

Additional information and documentation can be obtained from the following sources:

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The Fire and Rescue Service Advisory Committee/FIREScope Board of Directors has approved the information contained in this document for application in the statewide Fire and Rescue Mutual Aid System.

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GUIDELINES FOR RAPID EXTRACTION IN HAZARDOUS MATERIAL ENVIRONMENTS

A hazardous materials incident with victims who have been exposed to a contaminant and are unable to remove themselves from the affected area creates challenges for first arriving resources which require quick actions with limited information. One of the primary missions that first responders may need to accomplish is rescue of exposure victims. The objective of rescue at hazardous material incidents is to rapidly extract people from unsafe areas and deliver them for decontamination and treatment, while controlling the associated risks to firefighters. The following information is provided to assist first responders in this decision matrix and provide guidance and considerations in making a risk assessment for these types of incidents.

To differentiate victim rescue from rescue of first responders, the term used to describe actions directed at retrieving civilian exposure victims is "rapid extraction." Incident Commanders may assemble units to perform extraction missions in Extraction Teams or Groups.

Under ideal conditions, everyone in the area of a hazardous materials release would self-rescue, gather in a location upwind and uphill, and initiate self-decontamination. In the case of industrial accidents, responders may find that the initial reaction by trained people on the scene of the release may closely match the ideal. This will not be the case, however, where the release is committed intentionally or accidentally on an unsuspecting and unprepared population. In the event of such a criminal act, the need to perform extraction of victims is more likely.

Rapid Extraction Risk and Benefit

Although extraction of exposure victims can represent the greatest risk of exposure to first responders, it may also be the most beneficial to the public.

The first responders' minimum PPE for extraction at a possible hazardous material event is structural turnouts, SCBA and if available, a personal dosimeter. By wearing the minimum levels of protection for these events, conducting appropriate assessments of risk, and following the minimum guidelines for preparation, extraction, and post-extraction, first responders have the ability to save lives while minimizing the risk.

In all most cases, unless meters are available to detect all radiation sources (alpha, beta, and gamma); all PPE must be considered contaminated at the conclusion of extraction activities.

Types of Extraction

Responders have a choice among different extraction methods, and should focus on using a method that minimizes risk but still allows the mission to be completed.

Extractions can be categorized by who performs the rescue: self-rescue or bystander rescue, which represents the least risk to the responder; responder rescue, where the level of risk and potential benefit may be initially unknown; and technical rescue, such as that performed by Urban Search and Rescue or Hazardous Materials team.

Assessment of Risk Vs. Benefit		
Type	Risk	Benefit
Self-Rescue	Low	High
Bystander Rescue	Low	High
Responder Rescue	Low-High	Unknown
Technical Rescue	Med-High	Unknown

Using remote methods to contact people in the unsafe area, such as the apparatus PA, a bullhorn, or in-place public address systems is the least risk method to get people to leave an unsafe area. Where this method is employed, less impacted people should be encouraged to assist those viable victims who have been impacted to a greater degree by the release (bystander rescue).

In some cases, responders may find that victims, though ambulatory, may need assistance to get to a safe environment due to the symptoms associated with the exposure, such as dimness of vision or confusion. This type of assisted rescue may require responders to be in proximity or even direct contact with the victims.

Extraction of unresponsive victims may result in exposure to levels of contamination that exceed the capability of the protective clothing available to first responders. As a result, this type of physical rescue or extrication may require the specialized equipment and PPE available to the Hazardous Materials team.

Risk Assessment

First responders must quickly assess whether there are victims needing extraction, the number of victims and what resources will be needed. In order to accomplish this assessment, Incident Commanders should assign a company to this task as soon as possible, in spite of the demands of the incident.

Since the primary protective equipment assigned to firefighters consists of structural firefighting PPE and SCBA, risk assessment should determine whether this level of protection is appropriate for the environment.

The primary factor in determining whether the environment is appropriate for structural

firefighting PPE and SCBA is the viability of the victims. Where the hazardous material is unknown, exposure victims are considered viable when they are able to control their movement (standing, sitting, or kneeling), or are able to respond verbally or physically.

Those victims who are unable to respond, or are unable to voluntarily control movement, may still be viable under certain conditions, e.g., the number of victims is low, they are not located in an enclosed space or the enclosed space can be adequately ventilated, and access to decontamination and treatment is immediately available.

The assessment to determine the presence of viable victims may include direct observation, interview of witnesses or employees exiting the affected area, and reports from other first responders. The existence of unprotected viable victims is a strong indication that the toxicity of the environment is below that which would impact a firefighter protected by full structural PPE and an SCBA for short exposures.

Even though an Incident Commander may determine that there are viable victims who need extraction, the scale of the incident will directly impact the decision process. Similar to multi-casualty incidents, the priority must be on providing the greatest good for the greatest number of people. Directing initial arriving units to provide emergency decontamination to self and bystander-rescued exposure victims may produce a better outcome than devoting all units to extraction efforts.

Rapid Extraction Guidelines

A successful extraction will minimize the exposure for both the victims and the rescuers, by limiting exposure time and providing immediate decontamination. To accomplish this, emergency decontamination must be available prior to entry along with sufficient backup personnel in place. Extraction teams should use no more than one SCBA bottle prior to evaluation for exposure by hazardous materials and emergency medical services personnel.

Prior to initiating rapid extraction, first responders shall take the following actions:

1. Establish that there are viable victims and a need for extraction operations.
2. Establish decontamination. At minimum, a charged hose line in the designated location.
3. Announce the intent to initiate rapid extraction to IC or incoming companies:
 - a. Identify the access point.
 - b. Identify the number of personnel on team.

Once it is determined that there are viable victims, decontamination has been established and the intent to initiate rapid extraction has been announced, first responders should take the following actions:

1. Establish rapid intervention. A single engine company may fulfill the rapid intervention requirement. At larger incidents, Incident Commanders should consider designating entire companies as Rapid Intervention.
2. Maintain continuous communications during extraction efforts

If sufficient resources are available a Rapid Extraction Team Leader should be identified to manage and coordinate operations extraction teams. A predicted work time should be established to ensure that personnel have sufficient air to carry out the mission and exit to decontamination without exhausting their air supply.

Rapid Extraction Team members need to manage their air supply in a manner that does not compromise the Team's ability to exit and complete decontamination prior to low air alarm activation. Upon encountering any of the following exit conditions, the Rapid Extraction Team must immediately leave the rescue site, make appropriate notifications, and proceed to decontamination:

1. Any signs or symptoms of exposure for any members of an extraction team.
2. Encountering an area with ONLY non-viable victims.
3. The sound of the first SCBA low air audible alarm.

Until the exit conditions are encountered, and while viable victims remain, first responders may continue extraction operations.

Upon completion of the extraction missions, first responders should:

1. Proceed through decontamination. Be guided by directions from the hazardous materials team.
2. Consider PPE used during extraction as contaminated, and keep it segregated from other equipment until it is determined to be safe.
3. Be examined by ALS personnel for post-entry symptoms and vitals.
4. Proceed to Rehab, as needed.

Decontamination of a rescuer who enters a contaminated area in structural firefighting PPE should be accomplished through doffing of the structural firefighting PPE. The rescuer should remain on supplied air during the doffing process and any wet decontamination if necessary should occur after the doffing process is completed.

Security

The Incident Commander should address the need to establish security with the law enforcement personnel. The responsible law enforcement agency having jurisdiction should provide resources for physical security and deem safe all operational areas

during a hazardous materials event. However, the absence of law enforcement should not, by itself, constrain companies from committing to life- saving activities, if an adequate risk assessment has been completed.

Except for specially trained and equipped units, law enforcement personnel are not able to enter areas that require respiratory protection. As a result, first responders must remain aware of their environment, and take steps to assure their own safety until such time as appropriate law enforcement resources are available. Initially assigning a company member to act as a lookout may be appropriate, but large-scale incidents may require assignment of one or more companies to survey perimeters and operational areas. Initial and continuous surveys should entail nothing more than a visual appraisal for suspicious people or objects, and appropriate notifications.

Implementing tactics based on the principles of LCES increases the safety of all members. In addition to lookouts, pre-designated evacuation signals, escape routes, and safety zones should be identified as part of the security and risk assessment.

Personal Protective Equipment

The minimum protection for any hazardous material incident consists of full structural PPE, SCBA, and, if available, a personal dosimeter. (As an option, the Incident Commander may determine that the level “B” ensemble is appropriate for extraction activities.) This level of protection exceeds the universal precautions required for a biological incident or release. Although structural PPE is not designed to be chemically resistant, it can provide a level of protection sufficient to allow firefighters to perform extraction of viable victims present in a chemical, biological and radiological environment.

An original report published in 1999 by the U.S. Army Soldier and Biological Chemical Command (SBCCOM) established that structural firefighting PPE with SCBA does provide a measurable level of protection from specific WMD atmospheres. As stated in the revised 2003 version of that report, “.... FFPE, with SCBA, continues to afford limited protection, which is sufficient to allow firefighters to perform quick rescue operations in a chemical agent environment.”

The same study also confirmed that a level “B” suit, properly donned, provides superior protection to that provided by structural PPE. It was also found that the combination of level “B” suit worn under structural PPE affords better protection than the individual components.

Statistically, the most significant route of exposure for hazardous materials continues to be inhalation. When the decision to extract victims has been made, responders shall don and use SCBA’s to protect themselves from exposure. SCBA’s will continue to be worn until the atmosphere has been declared safe by the Incident Commander, as determined by members of the hazardous materials team or other technical resources. The use of SCBA’s may also extend to companies engaged in decontamination

operations.

Although vapor hazards can represent the most significant threat to responders, specific steps should be taken to prevent direct contact with liquid or solid materials. Avoiding deposits of liquids and solids is the primary means of protection from exposure, and avoidance includes handling patients in a manner that prevents contamination.

During extraction operations, feet and hands are most at risk to become contaminated. Leather footwear and gloves represent risks of absorption and continuous exposure to the wearer. Nitrile gloves, if available, worn underneath leather gloves provide greater protection from exposure. Consider proper disposal of leather boots and gloves that may have absorbed contaminants.

Radiation

The donning of structural PPE and SCBA, utilization of survey meters and personal dosimeter is the best means of preventing injury from radiation sources during extraction activities. The personal dosimeter will detect gamma radiation and strong beta sources, allowing for establishing a record for exposures to rescuers. It is important that all personal dosimeters are zeroed out prior to entry to record radiation exposure doses to rescuers. A predetermined maximum exposure should be established prior to rescue operations. Alpha radiation represents a risk to rescuers if inhaled or ingested, and donning an SCBA provides protection from this route of exposure.