

# Keeping you safe!

This column aims to provide hazmat/CBRNE community with operational guidance on the selection and performance of equipment and tactics. In this issue, we focus on the decision to evacuate or shelter-in-place following a hazardous material or CBRN release. Much of the guidance for such events and the appropriate decision-making process was developed in response to India's December 1984 methyl isocyanate disaster in Bhopal, and lessons drawn from radiological incidents. Post-incident evacuations are very different from those that are done beforehand, as happens with some severe weather events, as they must occur simultaneously with the response, resulting in a resource constrained operation.

Evacuation is usually defined as the relocation of the public from a high risk area to a low risk area to minimise exposure, while sheltering-in-place uses a structure and its indoor atmosphere to temporarily separate people from an external hazardous atmosphere.



Decision-making starts by evaluating the risk to the public. First, what is the material to which they may be exposed? Who will be affected, and are they part of a susceptible population? Would exposure be via inhalation, dermal contact or physical injury? Would the anticipated exposure last minutes, hours or days? What is the estimated concentration of threat material to which people may be exposed? Operationally, a combination of the two different community protection approaches is often used. The emergency response resources available, and the ability to inform the community about the threat and recommended protective actions are also important considerations when evaluating risk.



Many protective action criteria can be applied to help in risk evaluation. The US Environmental Protection Agency's acute exposure guideline levels (AEGLs) are one example. These are often used, in combination with location specific information, to determine a suitable approach. AEGLs are scaled to reflect the threat and help inform the choice of community protective actions. For example, AEGL-1 concentrations are not expected to adversely impact health, while AEGL-3 levels represent a higher chance of severe effects which may impair the ability to escape.

The decision to evacuate is never taken lightly, and is often due to a potential boiling liquid expanding vapour explosion (BLEVE) situation, an uncontrolled toxic or flammable release, or because the local buildings are unsuitable for sheltering-in-place. Evacuations are labour intensive, requiring considerable logistics planning, and are not always the safest solution or cannot be quickly implemented.

A research team at Brown university found there was a significant increase in morbidity (up from 1.8% to 8.3%) and mortality (up from 2.7% to 5.3%) in nursing home patients due to the evacuation process itself. Public messaging must be clear, precise and timely to ensure those affected can implement before they are exposed to the threat agent.



When introducing an evacuation plan, first ensure you have distinct and credible boundaries for public warning and instruction. Consider using plume models as a visual indicator of potential chemical movement over time, based on the release characteristics and weather conditions. These will show who will be affected, appropriate evacuation routes and monitoring strategies. It is critical to have assets in place to help coordinate and direct people who are evacuating themselves, and for those needing transportation to safe refuges.

You must identify suitable facilities for both short-term and long-term relocation that can house the general public, including those with medical conditions and animals, and provide support services (food, water, sanitation, medical care and protection). The location, status, and capability of these facilities must be provided continuously to the community at risk. You must also plan for potentially contaminated individuals arriving at shelters, in need of decon prior to entry.

Sheltering-in-place is more often the chosen or default solution following a hazmat/CBRN release. This choice depends upon the building's suitability, potential for agent penetration and the timeline. Generally, sheltering-in-place is selected for a fast-moving release and should be limited in duration to under three hours. The community involved needs information to ensure that they can follow the sheltering protocol. First, guide people to move indoors to an internal room, ensure that the windows and doors are closed and then turn off any air conditioning while awaiting further instructions.

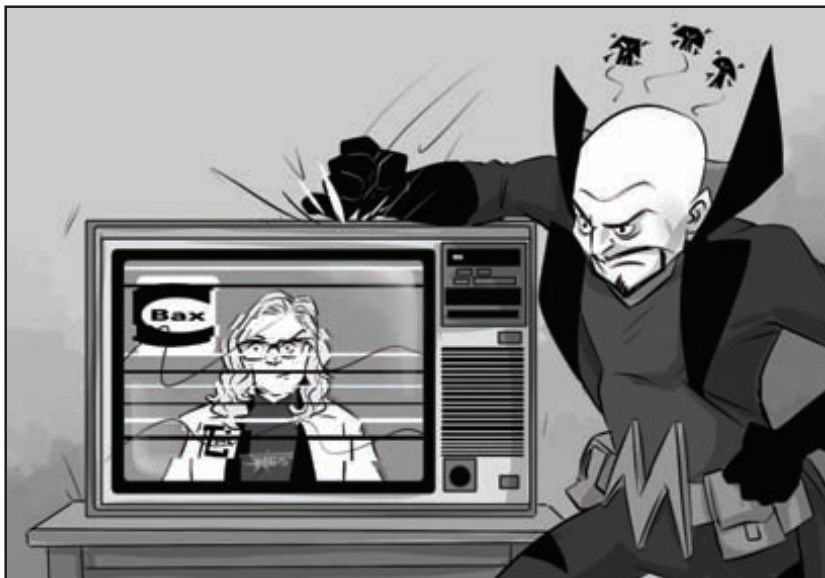


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These instructions may cover how to maintain communication, for instance via radio, TV, internet, etc, further information about the incident status, when the action is no longer required, and how to return to normal. Before informing the public that it is safe to venture outside and to ventilate the building, provide them with monitoring results for that area in simple terms. For example, "We have conducted monitoring and cannot detect any presence of the hazard in this area." Do not assume neighbouring areas are safe as well - prove it. Often after the plume has passed, the concentration of the hazard is greater inside dwellings than outside. Regardless of the chosen approach, it is critical to deliver a correct and consistent message to gain public trust. People will want four types of information.



- **Situational awareness.** Provide an initial alert, warning and instructions regarding the problem, who is affected, and how long it is expected to last.
- **Expert knowledge.** Provide advice from a credible source to explain the risks, potential short-term and long-term effects, and identify susceptible populations.
- **Emerging information.** Continuously update the public with contemporary data and guidance. For example, following the initial alert, warning, and instruction, provide continuing instructions, corrective instructions, and terminating instructions.
- **Recovery assistance.** Provide guidance on shelter locations and where to get further information.



Appropriate messages to the community help to ensure a positive outcome for all. Community messaging should cover the hazard, the location, recommended guidance, the timeline and the source of information in a clear, concise format.

## Emergency response considerations

All response agencies need to preplan with their response partners. You should consider your threat environment including the types of materials, quantities, local environment and weather conditions. Local environments may range from mass gatherings to industrially based threats such as ammonia storage or chemical manufacturing facilities.

Remember, identify the action criteria that will be applied, agree on the decision-making approach, identify at risk communities, for example schools, hospitals or sports and entertainment venues, and default community protective actions based on these threats. This planning extends even further into selecting detection equipment, plume modelling, decontamination and communication strategies, and public health preparations including hospitals and public education. Importantly, practice together so that all your partners are familiar with the threats and the community protection approaches. While sheltering-in-place is the default option for most chemical incidents, it is important to prepare for events where evacuation is essential.

Images are courtesy of Phil Buckenham <https://philbuckenhamart.wixsite.com/philbuckenham>