Dr Christina Baxter, of EmergencyResponseTIPS.com and Hazard3.com, offers helpful advice for first responders

Keeping you safe!

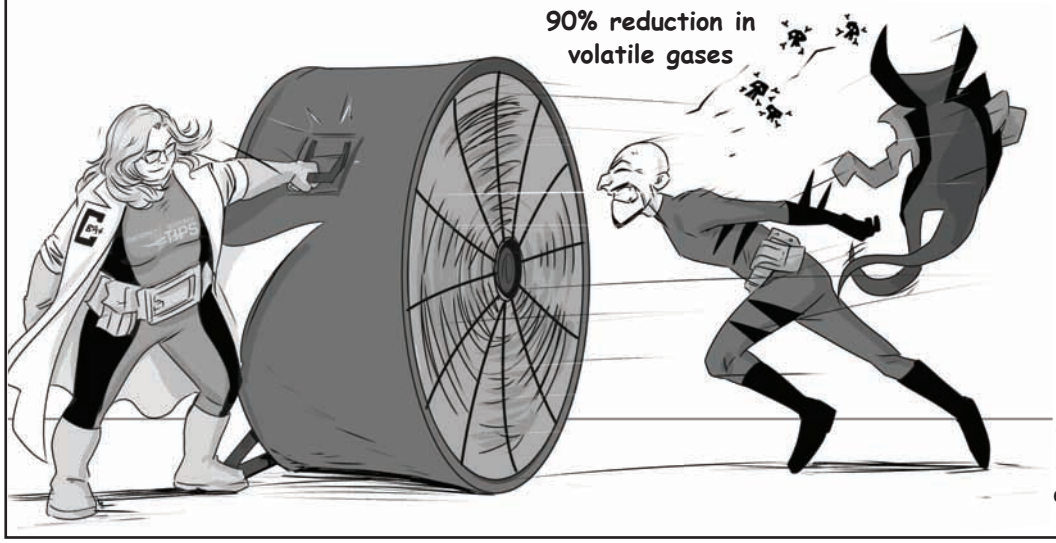
This column aims to provide operational guidance to the hazmat/CBRNE community on the selection and performance of equipment and tactics. This time we focus on decontamination and the use of dry methods for decontaminating people, protective equipment and sensitive equipment. Current approaches to decon incorporate a mixture of dry, hybrid and wet decon techniques. For more on the hybrid approach, please revisit *CBRNE World* 2021-02.

One of the significant improvements in hazmat/CBRNE response over the past decade has been the modernisation of decon, based on scientific evidence now available from research reported by Maibach, Gaskin, Chilcott, and others. Such studies demonstrate that large volumes of water are unnecessary and often counterproductive in both toxicology and environmental contexts.

They show that a mixture of approaches was successful, such as dry and hybrid decon. The method(s) selected should be proportionate reflecting the contaminant, its location and extent. For example, enhanced ventilation often provides suitable dry decon for volatile chemicals, while removal of the outer layer of clothing results in up to 90% contamination removal when employed in a timely manner.

Today, most teams use a mixture of dry, hybrid and wet decontamination approaches. It is important to understand when and how to apply each of these procedures.

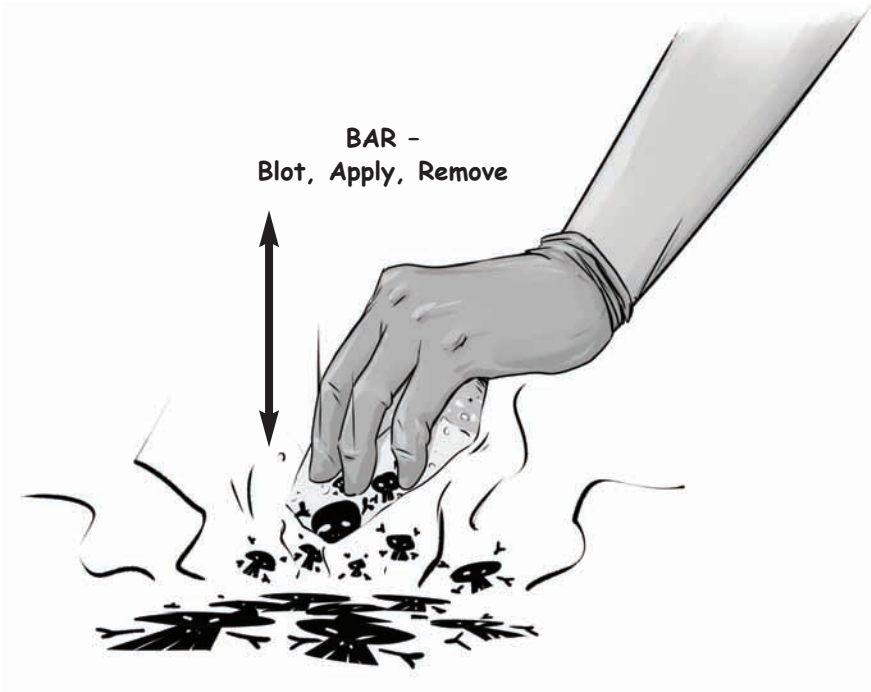
Dry and hybrid decon techniques have been used for decades especially by the military, due to available scientific knowledge, water scarcity, lack of logistical support, or weather conditions (under 2°C (35°F)). Fuller's earth is a well known early example. The field rapidly developed improvements such as incorporating resins, or specific decontaminants, into kits like the M13 dry decon kit, M258 hybrid decon kit, and later the M291 dry decon kit for military use. The M291 kit was replaced by reactive skin decontamination lotion hybrid decon kit in 2009 and is still used today.



Over the past 20 years, new products have emerged, based on better understanding of materials and decontamination. The ideal dry decon product will readily absorb large amounts of liquid threats from skin or surfaces, minimise evaporation and potential for secondary exposures, not require use of water and/or solvent, incorporate neutralising agents, not include free-flowing particles that can be inhaled, and be inexpensive. Dry decon solutions for objects, large surfaces or sensitive equipment might be suitable if the material itself is not an inhalation hazard for unprotected operators and does not interfere with the operations of equipment needing decon.

Select your method

It is important to identify the CBRN agent concerned as the nature of the contaminant, its location, extent, and the surface or object are key factors when selecting a suitable decon method. Some solids, or powders, like fentanyl and some decontamination agents are readily resuspended in air and can pose a respiratory risk to responders or readily enter sensitive equipment. The responder must adopt suitable PPE and protect their respiratory system. This is also a consideration for contaminated patients.



Initial removal of any contaminant from skin, protective clothing or sensitive equipment, may be done by blotting with an absorbent material. First, gently blot any residual contaminant material before rubbing or wiping, to minimise resuspension, spread, and increased skin penetration. The blotting material should be the most chemically compatible and absorbent material available on scene, whether that's purpose designed decon wipes, wound dressing, paper towels, or other absorbents and materials.

When a CBRN agent, especially a chemical, interacts with the skin (ie contamination versus exposure) irritation, redness, dermatitis-like symptoms or pain are often evident. These symptoms are generally associated with liquids, high concentrations of aerosolised corrosive materials or strong oxidisers. In these cases water based decon or hybrid decon may be necessary.

For gases or high vapour pressure liquids that are not interacting with the skin, disrobing followed by enhanced ventilation using a fan if available, is suitable. Enhanced ventilation is one dry decon method using large volumes of moving air to remove contaminants, especially toxic or corrosive gases, but it is not suitable for all contaminants.

In many situations including non-corrosive and/or non-oxidising liquids, particulates or aerosols, blotting residual material may be the only step necessary prior to enhanced ventilation, to ensure all potential off gassing has occurred. This approach is often used for flammable, spontaneously combustible, and dangerous when wet materials as well as explosives.

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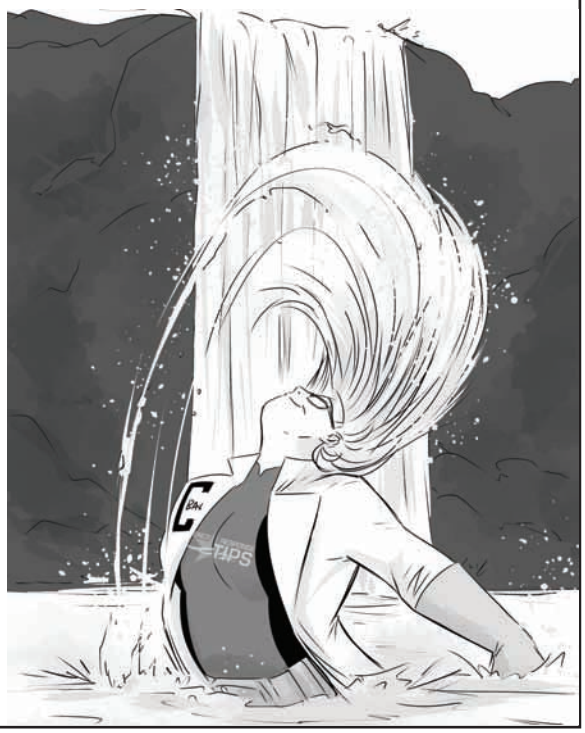
When toxins, illicit drugs, biological or chemical warfare agents, pesticides and other materials are the source of contamination, a hybrid decon approach is generally required, starting with dry decon (see *CBRNE World* 2021-02). First blot away any obvious contaminant, apply soap and water - or another suitable decontaminant - to the residual contaminant, and then remove the decontaminant by wiping, rinsing and/or active drying. This is the BAR - blot, apply, remove - method for hybrid decon.

Remember, for a person always start with disrobing then apply the selected decon method. Always begin the process at the top of the head, then face, hands, and any other potentially exposed areas. It is also critical to protect the person undertaking the decon activities and prevent material spread into the clean, cold zone.

For surfaces, including PPE, and decontaminating sensitive equipment consider the impact of the decon agent on the equipment before application. When applying be sure to wipe away from the PPE seams and interfaces and avoid entry ports for sensitive equipment. If using loose particulates, ensure that the decon team is not wearing air permeable PPE and [provide] proper respiratory protection, to minimise dermal and inhalation exposures.

1. Head 2. Face 3. Hands



Finally, use suitable detection methods to monitor the effectiveness of the decon process and confirm success.

To enhance your readiness to manage incidents and add dry decon to your toolbox, it is essential to engage with your security, public health and police agencies to identify likely threats and contamination scenarios. This informs the types of decon methods that are suitable and ensures your agency, allied responder approaches and training are current and appropriate for your operational context.

Remember to implement a safe and effective response using dry decon:

- Minimise opportunities to generate airborne particulates.
- Minimise opportunities for unexpected exposures.
- Wear appropriate respiratory and dermal protection.
- Ensure appropriate field expedient dry decontamination methods are available.

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