



**Homeland
Security**

Science and Technology

TechNote

U.S. Department of Homeland Security



System Assessment and Validation for Emergency Responders

The U.S. Department of Homeland Security (DHS) established the System Assessment and Validation for Emergency Responders (SAVER) Program to assist emergency responders making procurement decisions. Located within the Science and Technology Directorate (S&T) of DHS, the SAVER Program conducts objective assessments and validations on commercially available equipment and systems, and develops knowledge products that provide relevant equipment information to the emergency responder community.

SAVER Program knowledge products provide information on equipment that falls under the categories listed in the DHS Authorized Equipment List (AEL), focusing primarily on two main questions for the emergency responder community: "What equipment is available?" and "How does it perform?" These knowledge products are shared nationally with the responder community, providing a life- and cost-saving asset to DHS, as well as to Federal, state, and local responders.

The SAVER Program is supported by a network of Technical Agents who perform assessment and validation activities.

This TechNote was prepared for the SAVER Program by the National Urban Security Technology Laboratory.

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For more information on this and other technologies, contact the SAVER Program by e-mail or visit the SAVER website.

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Personal Decontamination Kits

Personal decontamination kits (PDKITs) are lightweight, ready-to-use kits used by first responders to remove or neutralize chemical or biological agents and toxic industrial materials (TIMs) that have accumulated on personnel and equipment. While PDKITs are not intended to replace a complete decontamination process, they can be used by law enforcement, fire service, and emergency medical service personnel in emergency situations when hazardous material resources are limited or not available.

Overview

PDKITs were originally designed and manufactured for the military to maintain operational effectiveness in the event of a chemical, biological, radiological, or nuclear attack. PDKITs similar to the military kits, as well as some military PDKITs, are now commercially available to the civilian responder community. In the event that responders become contaminated prior to donning adequate personal protective equipment, PDKITs provide responders with the capability to decontaminate themselves and fellow responders from chemical agents, biological agents, TIMs, and radioactive contaminants. Some kits also provide personnel the capability to detect and identify specific chemical or biological agents, collect and transport wet or dry chemical and biological samples, and conduct spot decontamination.

The rapid and correct use of PDKITs requires training in procedures and techniques for both self-aid decontamination and assisted-aid decontamination. Self aid refers to decontamination measures that responders can apply in helping themselves, and assisted aid consists of quickly removing possible contamination from a fellow responder in the event that the responder is unable to administer self aid.

Types of Contaminants and Decontamination Methods

Contaminants may be chemical, biological, or radiological. Chemical contaminants include nerve and blister agents and TIMs. If a chemical contaminant contacts the skin, it must be removed without delay. The degree of injury increases the longer the contaminant remains on the skin. TIMs are used in a variety of settings such as manufacturing facilities, maintenance areas, and chemical storage areas. Examples of TIMs are ammonia, chlorine, hydrogen cyanide, and pesticides.

Chemical agent and TIM decontamination can be accomplished by physically removing the agent or by chemically neutralizing the agent. Chemical decontamination converts toxic agents into innocuous products that can be safely handled. Physical decontamination involves mainly absorption of toxic agents and removal with a mitt or sterilized pad.



Figure 1. CHEMSORB Portable Decon Kit

Photo courtesy of W. W. Grainger Inc.

Common types of biological agents include bacteria, viruses, and toxins. Biological agents can be decontaminated by chemical and physical methods. Chemical decontamination renders the agent harmless by the use of disinfectants and chemical solutions. Physical decontamination techniques include heat and radiation, methods that would not be provided by a PDKIT.

Radioactive particles usually will not cause acute injury, but they should be removed as quickly as possible to prevent the spread of contamination and uptake in the body. The effects of internal contamination can be reduced by administering specific diluting or chelating agents. Surface radioactive decontamination is usually done by physical removal.

PDKIT Description

PDKITs typically come packaged in a small bag that can fit into a standard cargo pocket (Figure 1).

PDKITs made for decontaminating chemical agents and TIMs can include decontaminating mitts, lotions, or solutions, depending on the kit. Decontaminating mitts are used to physically remove and absorb liquid chemical agents that might be present on personnel and equipment. In addition to the absorbent padding, most mitts contain a powder that absorbs and neutralizes the toxic substance present on a surface.

Reactive Skin Decontamination Lotion (RSDL) is a product that may also be included in a PDKIT (Figure 2). It is a liquid decontaminant that was originally developed to remove or neutralize chemical warfare agents (CWAs) for the military. It has been adopted by first responders after gaining clearance from the U.S. Food and Drug Administration (FDA) in 2003. RSDL is applied to exposed skin with a lotion-soaked sponge applicator and can be used by first responders to



Figure 2. Reactive Skin Decontamination Lotion

Photo courtesy of Emergent BioSolutions Inc.

reduce morbidity and mortality resulting from exposure to CWAs and TIMs.

A biological decontaminant could be in the form of a disinfecting pad such as the one found in the M291 Skin Decontamination Kit, which is regulated by the FDA as a medical device. This kit contains individual pads impregnated with a decontamination compound Ambergard XE555 Resin, a black, free-flowing, resin-based powder. As the pad is scrubbed over the exposed/contaminated skin area, the contaminating agents are rapidly transferred into, trapped, and retained in the interior of the Ambergard XE555 Resin particles.

PDKITs are intended for external use only and contents may be slightly irritating to the eyes or skin. Personnel need to keep powders and lotions that may be included with some of the kits out of the eyes or open wounds and avoid inhalation of potentially harmful by-products.

FDA Regulations

No PDKIT standards currently exist. However, the powders and lotions included in kits are subject to FDA review. The PDKIT contents and technical specifications vary by manufacturer, and a limited number of manufacturers will customize their PDKITs to meet the needs of respective jurisdictions. However, jurisdictions are cautioned to ensure that the appropriate FDA clearances or approvals have been obtained for any PDKIT procured for responder use.

References

SAVER Market Survey Report. *Personal Decontamination Kits (PDKITs)*, January 2007.

Guide for the Selection of Biological, Chemical, Radiological, and Nuclear Decontamination Equipment for Emergency First Responders. DHS Guide 103-06, 2nd Edition, March 2007. Accessed on 22 June 2015.