FEMA **TechNote**

U.S. Department of Homeland Security
SAVER
System Assessment and Validation for Emergency Responders

The Federal Emergency Management Agency (FEMA) established the System Assessment and Validation for Emergency Responders (SAVER) Program to assist emergency responders making procurement decisions. The SAVER Program conducts objective operational tests on commercial equipment and systems and provides those results along with other relevant equipment information to the emergency response community in an operationally useful form. SAVER provides information on equipment that falls within the categories listed in the U.S. Department of Homeland Security Authorized Equipment List (AEL).

Information provided by the SAVER Program will be shared nationally with the responder community providing a life-saving and cost-saving asset to FEMA, 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. Further, SAVER focuses primarily on two main questions for the emergency responder community: "What equipment is available?" and "How does it perform?"

For more information on this and other technologies, please see the SAVER website or contact the SAVER Program Support Office.

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Technologies for Radioactive Decontamination of Building Surfaces

Buildings that are contaminated by a radiological dispersion device (RDD) or an improvised nuclear device may be decontaminated using technologies that are used to decontaminate structures at commercial nuclear power plants and U.S. government nuclear facilities. The following paragraphs describe several major types of decontamination technologies that are currently available with an emphasis on mode of operation, physical impact on the structures they are used to decontaminate, and type and volume of waste generated during operation.

Surface Scarification

In surface scarification, devices such as shavers and scabblers (figure 1) are used to cut or chip away outer layers of radioactively contaminated walls or floors, leaving behind an uncontaminated but scarred surface that may need to be resurfaced. A shaver typically consists of an electrically powered rotating drum whose surface is fixed with diamond blades to cut away contaminated surfaces, while scabblers use rotating heads equipped with steel or carbide bits to chip away contaminated surfaces. Electro hydraulic scabblers use high power electric arc discharges in place of abrasive bits to erode away contaminated surfaces. Scarification devices often can be adjusted to set the depth of material removed during each pass. This type of equipment comes in a variety of sizes, from hand-held units for use in closely confined spaces, to large self-propelled units for decontaminating extensive floor or wall areas. Exhaust hoses connected to air filters are used to collect generated dust to prevent the spread of contamination and to protect workers.

Figure 1. Surface Scarification

Surface Blasting

Surface blasting uses devices in which abrasive material is carried by a stream of pressurized air or water to remove radioactive contaminants from surfaces (figure 2). Abrasives used include grit, steel shot, glass beads, nut shells, sodium bicarbonate, and carbon dioxide (dry ice) pellets. Surface blasting can be destructive or nondestructive depending upon the abrasive material used and the force of the blasting stream. Exhaust hoses connected to air filters are used to collect generated dust and abrasives. Dry ice blasting produces no abrasive waste since the pellets evaporate after use. For systems using pressurized water, it may be necessary to treat the spent water prior to release into the environment.

Figure 2. Surface Blasting

Pressure Washing

Pressure washing relies on equipment ranging from conventional pressure washers to devices that generate very high-pressure (5,000 to 20,000 psig) streams of water capable of eroding concrete or brick (figure 3). Chemical additives can be used to increase the decontamination effectiveness of pressure washing equipment. Because the wash water can penetrate into porous materials, pressure washing can potentially remove contaminants that have penetrated into building material. Spent wash water may need to be collected and treated prior to release into the environment.

Figure 3. Pressure Washing

Chemical Extractants/Peelable Coatings

Chemical extractants and peelable coatings (figure 4) use mixtures of chemicals specifically formulated to physically adhere to or to dissolve radioactive contaminants bound to surface material. Extractants are sprayed or manually applied to the affected surface and may be scrubbed into porous material to remove subsurface contamination. After a defined treatment time, the extractant is rinsed or vacuumed away, carrying along the radioactive contaminants. Peelable coatings are chemical extractants that are applied as a liquid and then transform into a flexible solid layer that can be easily peeled away.

Figure 4. Peelable Coating

Chemical extractants and peelable coatings remove contamination without causing damage to the material to which they have been applied. They can potentially remove contaminants that have penetrated into porous materials such as concrete or brick. No dust or airborne debris is generated; however, the water used to remove extractants from treated surfaces may need to be collected and treated before being released into the environment. Peelable coatings generate no waste besides the coating itself.

Use Considerations

The effectiveness of any particular decontamination method will depend upon the chemical and physical characteristics of the radioactive contamination, e.g., a method that is effective in removing surface contamination may not remove contamination that has penetrated into a porous material such as concrete. Characterization of the radioactive contamination to be remediated is therefore an important first step in selecting the decontamination technology to be applied to a particular situation. Surfaces should be radiologically monitored after treatment to ensure that the desired level of decontamination is reached. The types and volume of waste generated differ significantly among decontamination methods and may be significant factors in choosing among potential decontamination methods. Nondestructive methods are preferable when buildings are to be restored to usability; however, more destructive methods may be acceptable when buildings are to be demolished and the goal of the decontamination effort is to limit the amount of material that must be discarded as radioactive waste.

Resources

Technology Reference Guide for Radiologically Contaminated Surfaces, EPA 402-R-06-003, March 2006, provides a detailed discussion of current technologies for decontaminating radiologically contaminated building materials. This report and other information pertinent to the clean up of radioctively contaminated buildings can be found at: http://www.epa.gov/radiation/cleanup/pubs.html

The Oak Ridge Institute for Science and Education of the U.S. Department of Energy maintains a website containing assessment reports on a wide variety of radioactive decontamination technologies at: http://www.orau.gov/ddsc/emcleanup.htm

The Occupational Safety and Health Administration (OSHA) provides useful information on protecting the safety and health of workers involved in RDD decontamination projects at the website: http://www.osha.gov/SLTC/emergencypreparedness/rdd_tech.html