MITIGATION - SCIENCE AND TECHNOLOGY ADVANCES FOR CHEMICAL AND BIOLOGICAL HAZARD MITIGATION

Development Of A Chemical Decontaminant For Critical Areas

Janlyn Eikenberg U.S. Army DEVCOM Chemical Biological Center **Michelle Sheahy** U.S. Army DEVCOM Chemical Biological Center **Doug Nichols** U.S. Army DEVCOM Chemical Biological Center **Stefanie Smallwood** U.S. Army DEVCOM Chemical Biological Center **Kevin Morrissey** U.S. Army DEVCOM Chemical Biological Center **Brent Mantooth** U.S. Army DEVCOM Chemical Biological Center **Michael Chesebrough** U.S. Army DEVCOM Chemical Biological Center **Jill Ruth** U.S. Army DEVCOM Chemical Biological Center

Toxic chemical release, either accidental or deliberate, is a deadly, tragic, and chaotic event. Contamination of a key points of infrastructure, including airports and seaports, can hinder life-saving response by medical and military personnel and can slow evacuation efforts. This program aims to develop a rapid, cost-effective way of decontaminating large-scale infrastructure and minimize the risk for vehicles and personnel which must traverse through a contaminated area. Use of traditional decontaminants is not feasible for wide area applications due to cost, preparation, storage, and efficacy limitations associated with scale up. This work explored the use of reactive formulations based on widely available commodity chemicals for direct remediation and the use of commercially available agricultural and construction polymers for encapsulation of the contaminant. A large variety of reactive chemicals were screened for their ability to remove chemicals from concrete and asphalt surfaces. The best performers were then downselected based on logistics considerations, including price, environmental impact, health and safety, scalability, and material compatibility. Of these chemicals, peroxysulfate oxidants provided the best profile of efficacy and logistics over other chlorinated oxidants and caustic bases. Current efforts have focused on refining and evaluating a formulation based on these underlying chemistries. The optimization of the peroxysulfate chemistries used a Design of Experiments (DOE) approach to statistically evaluate the most influential process factors of the formulation to optimize for contaminant reduction. Results of this optimization approach will be shared in the presentation. Evaluation of contact and vapor hazards from the concrete and asphalt substrates after decontamination will be conducted to determine potential transfer hazard. This technology aims to fit an unfilled need and enable first responders and military personnel to operate in a contaminated environment more safely. Experimental details, results and path forward will be provided in the presentation.

This research is funded by DTRA JSTO project CB10662, Dr. Glenn Lawson and Dr. Charles Bass.

Approved for public release; distribution is unlimited.