

RECENT PRODUCTS THE HOMELAND SECURITY RESEARCH PROGRAM DECONTAMINATION- RELATED EDITION

**MANY OF OUR PRODUCTS
HAVE MULTIPLE USES, NOT
JUST HOMELAND SECURITY**



Rad Decontamination Demonstration at Battelle Memorial Laboratory, June 2015
Report and Technical Brief are coming

COMPUTER TOOLS

[Waste Estimation Support Tool User Guide Version 2 \(with download instructions\)](#)

The U.S. Environmental Protection Agency’s (EPA’s) Waste Estimation Support Tool (WEST) is a novel tool for estimating the type and amount of waste generated from cleanup after a radiological incident. The WEST was developed to support responders and planners by generating a first-order estimate of the quantity and characteristics of waste resulting from a radiological incident as a function of remediation choices. The purpose of this manual is to provide you with the necessary information to operate the main WEST functionality. Described in this manual are methods for installing, configuring, and operating WEST. Before operating WEST, you should have a basic knowledge and understanding of geographic information systems (GIS). It is highly recommended that users have previous experience in using ArcGIS, FEMA’s Hazus-MH, and Microsoft Excel. The “icon key” to the left contains symbols intended to provide support within a particular area. Look for these symbols throughout this guide for important information and additional guidance.

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Products that Support Sampling and Analysis



[Rapid Radiochemical Method for Isotopic Uranium in Building Materials for Environmental Remediation Following Radiological Incidents](#)

Technical Brief

[Rapid Radiochemical Method for Plutonium-238 and Plutonium-239/240 in Building Materials for Environmental Remediation Following Radiological Incidents](#)

Technical Brief

These methods are also available through the Selected Analytical Methods Web Application <http://www.epa.gov/sam/>

U.S. EPA's Homeland Security Research Program

U.S. EPA's Homeland Security Research Program (HSRP) provides scientific solutions that:

Improve water utilities' abilities to prepare for and respond to all hazards incidents that threaten public health.

Advance EPA's capabilities to respond to wide area chemical, biological or radiological contamination incidents, including those resulting from terrorism or natural disasters.

[Rapid Radiochemical Method for Radium-226 in Building Materials for Environmental Remediation Following Radiological Incidents](#)

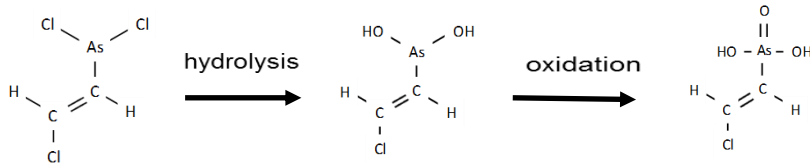
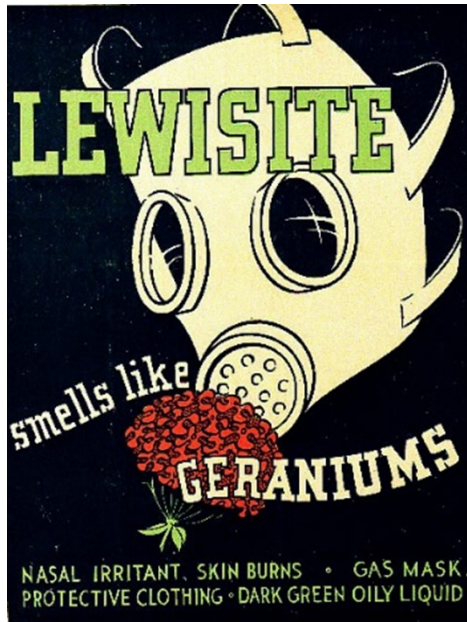
Technical Brief

[Rapid Radiochemical Method for Total Radiostrontium \(Sr-90\) In Building Materials for Environmental Remediation Following Radiological Incidents](#)

Technical Brief

[Rapid Radiochemical Method for Americium-241 in Building Materials for Environmental Remediation Following Radiological Incidents](#)

Technical Brief



A method for the detection of Lewisite is under review and soon to be available.

Products that Support Sampling and Analysis

[Rapid Method for Sodium Hydroxide Fusion of Concrete and Brick Matrices Prior to Americium, Plutonium, Strontium, Radium, and Uranium Analyses for Environmental Remediation Following Radiological Incidents](#)

Technical Brief

[Rapid Method for Sodium Hydroxide/Sodium Peroxide Fusion of Radioisotope Thermoelectric Generator Materials in Water and Air Filter Matrices Prior to Plutonium Analyses for Environmental Remediation Following Radiological Incidents](#)

Technical Brief

Coming in FY2016

Effectiveness of Liquid Decontamination Technologies for Surfaces Contaminated With Blister Agents

Effectiveness of on-site waste treatment using low tech methods for materials contaminated with bacterial spores

Report for the Demonstration of Radiological Decontamination and Mitigation Technologies for Building Structures and Vehicles

Effective conditions for use of H₂O₂ vapor in indoor environments

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PRODUCTS RELATED TO FATE, TRANSPORT OR PERSISTENCE

[PARTICLE TRANSPORT OF RADIONUCLIDES FOLLOWING A RADIOLOGICAL EVENT](#)

Report

This literature review was conducted to address the current state of knowledge on particle transport relative to radiological sources and their host environments. More specifically, this review seeks to 1) determine whether empirical evidence exists for further characterizing RDDs according to literature pertaining to nuclear weapon detonations and nuclear power plant accidents, 2) provide an overview and analysis of the current state of knowledge related to radiological sources with reference to particle transport, 3) contrast the behavior of radionuclides in urban and rural environments, and 4) explore the current state of radiological transport models, taking the above findings into consideration.



[Comparative Efficacy of Sporicidal Technologies for the Decontamination of *Bacillus anthracis*, *B.atrophaeus*, and *Clostridium difficile* Spores on Building Materials](#)

Report

Comparative sensitivity (or resistance) of the spores of *Bacillus anthracis* (Ames), *Clostridium difficile* (American Type Culture Collection (ATCC) 43498), and *B. atrophaeus* (Dugway Proving Ground-prepared ATCC 9372) to three commercial sporicidal technologies (vaporous hydrogen peroxide (VHP), chlorine dioxide gas (CD), and pH-amended liquid bleach) was evaluated. Comparative decontamination efficacy of these technologies has previously been evaluated for building interiors by the US EPA's Office of Research Development. However, until now, no direct side-by-side laboratory efficacy studies had been conducted to compare the relative resistance of the Dugway *B. atrophaeus* spores (also known as *Bacillus atrophaeus* or *B.g.*) to the resistance of *Bacillus anthracis* Ames spores or *C. difficile* spores. The main objective of this study was to evaluate the validity of using Dugway prepared *B. atrophaeus* spores as a surrogate for spores of the Ames strain of *B. anthracis* in decontamination testing.

PERSISTENCE OF CATEGORIES A AND B SELECT AGENTS IN ENVIRONMENTAL MATRICES

Technical Brief and Full Report

The purpose of this brief is to summarize persistence data documented in an EPA literature review (U.S. EPA, 2014a) entitled Persistence of Categories A and B Select Agents in Environmental Matrices (EPA/600/R-14/074). Category A biological agents cause high rates of mortality and are easily disseminated or easily transmitted from person to person. Category B agents cause illness with low mortality and are moderately easy to disseminate. Assessment of persistence data is important to (1) allow informed emergency response and remediation decisions following a contamination incident, and (2) identify gaps in the current state of the science so research can be focused toward closing these gaps



PRODUCTS RELATED TO DECONTAMINATION STUDIES



[Decontamination Line Protocol Evaluation for Biological Contamination Incidents Assessment and Evaluation Report](#)

The primary objective of this investigation was to evaluate and improve the effectiveness of each stage of the standard operating guideline (SOG) that is used to provide guidance to EPA and contractors on decontamination of personnel and samples in long-term response to biological contamination. The “Long Term Biological Decontamination Line” SOG is used to prevent the spread of contamination beyond the exclusion zone (EZ), often called the hot zone; to remove personal protective equipment

[Decontamination of Agent Yellow, a Lewisite and Sulfur Mustard Mixture](#)

Report

The objective of this evaluation was to develop/demonstrate and apply methods to determine the neutralization efficacies of various readily-available, liquids for the decontamination of Agent Yellow, a mixture of the chemical warfare agents Lewisite and sulfur mustard (HD).

PRODUCTS RELATED TO DECONTAMINATION STUDIES

[Capture of Methyl Bromide Emissions with Activated Carbon Following the Fumigation of a Small Building Contaminated with a Bacillus anthracis Spore Simulant](#)

Journal Article

A wide-area *Bacillus anthracis* spore contamination incident will present immense challenges related to decontamination capacity. For this reason, fumigation with methyl bromide (MeBr) has been proposed as a potential remediation option. Thus, we present for the first time the results of a full-scale study to evaluate an ACS employed for the capture of MeBr at conditions that would be used for decontaminating a building structure contaminated with *B. anthracis* spores. Airflow rate, temperature, RH, and MeBr levels were measured within the ACS during its operation. Despite the relatively high humidity, temperature, and MeBr levels, the MeBr capture efficiency of the ACS was demonstrated to be more than 99%. The concentration of MeBr exhausted from the structure was reduced from 41,000 to 136 ppmv in 3.5 hr, corresponding to an overall atmospheric emission rate of less than 2 kg. The practical adsorption rate of the ACS was determined to be 4.83 kg MeBr/100 kg carbon. The information and data presented here will facilitate future use of this technology when fumigating with MeBr.

[Decontamination of Outdoor Materials Contaminated with Anthrax Using Sodium Persulfate or Chloropicrin](#)

This investigation focused on decontamination of two types of top-soil (one procured from a garden center and the other obtained from a soil testing laboratory), as well as four porous outdoor building materials (wood, concrete, asphalt, and brick). Decontamination efficacy tests were conducted with spores of virulent *B. anthracis* or non-virulent *B. subtilis*. Decontamination efficacy was quantified in terms of log reduction (LR), based on the difference in the number of bacterial spores recovered from positive controls and test samples. A decontaminant that achieves an LR value >6 (i.e., at least a 99.9999% reduction in spores from test coupons compared to positive controls [coupons not exposed to decontaminant]) is considered effective. Tests were conducted at ambient temperature and relative humidity with various contact times and application methods to assess the effect of these operational parameters on decontamination efficacy.

Results

Chloropicrin

Unfortunately, chloropicrin was only minimally effective (the maximum LR achieved was 1.3 LR) in the three experiments conducted

Sodium persulfate activated with hydrogen peroxide

In the two initial tests with only the two soil materials, complete inactivation of both spore species was obtained on both types of soil, confirming previous test results.

In terms of the number of tests in which the average LR of *B. anthracis* spores was ≥ 6.0 (a benchmark for efficacy to gauge relative ease of decontaminating these materials), this occurred in eight of the tests for asphalt, five tests for both wood and brick, and four tests for concrete.

EFFECT OF PRESSURE WASHING CONDITIONS ON THE REMOVAL OF CS FROM URBAN SURFACES

Report

This study investigated the impact of water pressure conditions for decontamination of urban surfaces contaminated with cesium (Cs). The contaminated surfaces were prepared with two different deposition methods to control the penetration depth of Cs using water and methanol as solvents; the surfaces were then washed in a chamber, simulating the delivery of high pressure water. Various water pressures, applied in both vertical and horizontal orientations of the surface, were evaluated for efficacy against the contaminated coupon surfaces. The amount of Cs in the liquid and solid portions of the water rinsate samples was measured and analyzed to determine the impact of individual wash conditions.



Finished concrete , brick , and asphalt coupons

Results

In general, none of the spray procedures explored in showed evidence of causing lasting effects on the physical integrity of wallboard, regardless of paint finish.

Surface sampling methods on previously-wetted ceiling tile and carpet materials proved to be ineffective compared to extractive sampling methods.

For upholstery, the antimicrobial properties of this indoor/outdoor material apparently prevented a conclusive assessment of the decontamination efficacy of the spraying procedure.

Spraying procedures proved less effective on porous materials than on non-porous materials. These results suggest that an alternative decontamination method should be considered for porous items in lieu of a spray-based method

[Expedient Approach for Decontamination of Biologicals – Indoor Environment Determination of Operationally Effective Liquid Decontaminant Application Methods for Indoor Decontamination](#)

Report

The primary objective of this investigation was to determine the effectiveness of an expedient approach for indoor decontamination. Such approaches were utilized in previous anthrax remediation efforts, and their effectiveness has been determined experimentally at the bench-, pilot-, and field-scale. While this approach has been demonstrated to be effective under certain conditions, the material impact to common indoor surface types when this approach was used under efficacious conditions has yet to be determined comprehensively. To close this knowledge gap, the current study evaluated the impacts of spray-based decontamination procedures on wallboard, one of the most common and abundant indoor surface types, and a surface type with high likelihood of wetting impact due to its adsorptive properties.