The TTEP Quarterly

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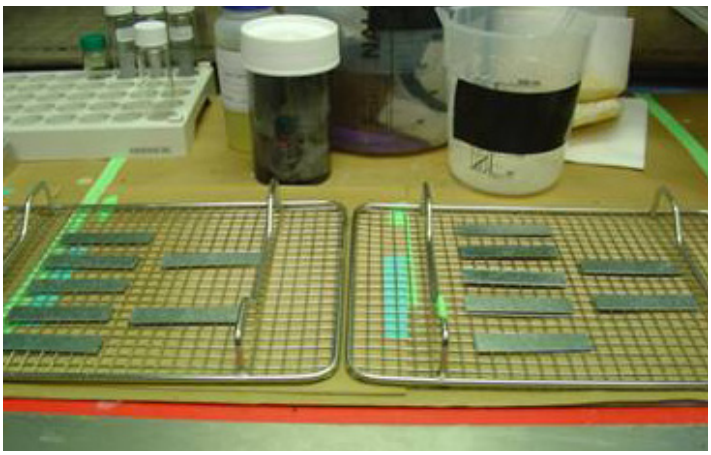
The quarterly update of U.S. EPA's Homeland Security Technology Testing & Evaluation Program (TTEP)

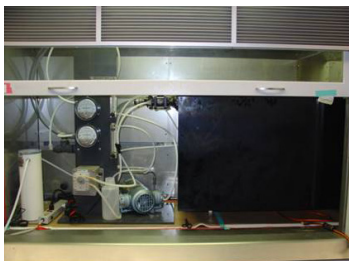
Decontamination of Galvanized Metal Contaminated with Chemical Agents

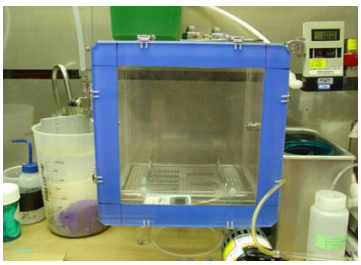
NHSRC has recently completed an evaluation of chlorine dioxide (ClO_2) fumigant for decontaminating galvanized metal surfaces contaminated with sulfur mustard (HD) and thickened HD (THD). HD is a chemical warfare agent that is persistent in the environment and on building materials. Because HD is one of the more persistent chemical agents, an indoor or outdoor release of HD may require surface decontamination. The efficacy of ClO_2 fumigation for neutralizing HD and THD was determined by spiking neat HD and THD onto galvanized metal coupons (see top picture) and exposing the coupons to ClO_2 fumigation for various contact times (1, 2, or 7 hours) at specified environmental conditions.

Following exposure, HD or THD was extracted from the coupons and analyzed by gas chromatography-mass spectrometry to quantitatively determine the concentration of HD and THD remaining. In addition, potential by-products were identified by comparing mass spectra for unknown peaks in the chromatograms to spectral libraries. Following testing, the metal coupons were inspected for any damage caused by the fumigant. The decontamination chambers used for test and control substances are shown in the bottom pictures to the right. The test chamber was fabricated from black acrylic because ClO_2 is light sensitive. Ports were added to the chamber to accommodate connection to the ClO_2 generator, a humidification source, and midget impingers for air sampling within the chamber during decontamination. The report for this evaluation is undergoing review and is expected to be released in the summer of 2010. For more information on this evaluation, contact Lukas Oudejans at oudejans.lukas@epa.gov or 919-541-2973.



Galvanized metal test coupons being prepared for testing





Decontamination chambers for test substances (left) and controls (right)

Welcome to TTEP

The U.S. Environmental Protection Agency (EPA) is actively participating in the national homeland security effort by ensuring the protection of the nation's drinking water systems and is focused on improving the nation's ability to respond to terrorist attacks affecting indoor and outdoor environments. The National Homeland Security Research Center (NHSRC) under EPA's Office of Research and Development has established the TTEP to assist this effort. TTEP is conducting unbiased third-party performance evaluations of commercially available homeland security technologies, incorporating stakeholder guidance and a high degree of quality assurance oversight. Completed TTEP documents may be found at www.epa.gov/nhsrc/ttep.html. Questions about TTEP should be directed to Mr. Eric Koglin (koglin.eric@epa.gov or 702-798-2332).

EPA and Air Force Partner on Evaluation

For the U.S. Air Force (USAF) and EPA, Battelle recently completed an evaluation of the Inficon HAPSITE Smart gas chromatograph-mass spectrometer (GC-MS). The HAPSITE Smart is a portable GC-MS designed for on-site analysis of volatile organic compounds in air. The optional HAPSITE Headspace Sampling System (HSS) and HAPSITE SituProbe Purge and Trap attachment also facilitate on-site water analysis. USAF Bioenvironmental Engineering personnel use Inficon's HAPSITE Smart to detect and measure contaminants in emergency response situations, to conduct environmental sampling, and to monitor personnel exposure to toxic chemicals. The use of the HAPSITE Smart is also a critical part of the U.S. Central Command Air Force's concept of operations for determining health risks in chemical warfare scenarios. Similarly, EPA has the responsibility to help protect the public in instances of accidental or deliberate releases of toxic industrial chemicals (TICs). That responsibility makes the HAPSITE Smart a potentially valuable tool for EPA's Regional Response Teams.

Performance tests were conducted by challenges with chemical warfare agents (CWAs) in air, and with TICs in water using the HAPSITE HSS and SituProbe Purge and Trap attachments. Performance testing focused on accuracy, precision, detection limit, and inter-unit comparability. New CWA calibrations were developed for selected agents to improve quantitative accuracy. The HAPSITE Smart's capabilities were also expanded by developing new calibration curves for selected TICs and CWA degradation products in water. Testing of nine HAPSITE Smart units with TICs showed good sensitivity and within-unit precision but less precise results when compared between units; software factors contributing to this behavior were called to the vendor's attention. The final report on the HAPSITE Smart evaluation will be submitted to the USAF at the end of May 2010. For more information about this evaluation, contact Thomas Kelly at kellyt@battelle.org or 614-424-3495.

Soldier with Inficon HAPSITE Smart GC-MS

Evaluation of Household Cleaner as a Radiological Decontamination Agent

The National Response Framework, Nuclear/Radiological Incident Annex, published in June of 2008, designates EPA as a coordinating agency for long-term recovery following terrorist incidents involving radioactive materials. This directive gives EPA the governmental responsibility for environmental response following releases of radiological materials which impacts non-coastal private property. To meet the expected technology needs associated with acts of radiological terrorism, NHSRC is conducting decontamination technology evaluations through TTEP. These technology evaluations provide data to support selection and use of decontamination technologies for indoor environments contaminated with radiological threat agents.

During the spring and summer of 2010, an evaluation will be conducted using Simple Green® commercial cleaner, which may be used for radiological decontamination.

Simple Green Cleaner

This cleaner was selected because of its widespread availability in stores across the United States and the consistency of its base chemical formulation regardless of geographical region. It will be used to clean coupons of several common indoor materials (wood finished with polyurethane, vinyl flooring, painted wall board, formica laminate, and polished granite) following contamination with a known amount of cesium-137. These surfaces were selected because they are likely to be present in a residential setting (e.g., food preparation areas, furniture, floors, etc.) and to require decontamination following terrorist use of a radiological dispersion device. Following cleaning (spray on Simple Green, scrub with brush, and wipe with damp towel), the residual radiological activity will be measured to determine the effectiveness of Simple Green as a radiological decontamination agent. For more information about this technology evaluation, contact John Drake, EPA, at drake.john@epa.gov or 513-235-4273.

EPA through its Office of Research and Development funded and managed the research described herein under Contract GS-23F-0011L to Battelle. It has been reviewed by the Agency but does not necessarily reflect the Agency's views. No official endorsement should be inferred. EPA does not endorse the purchase or sale of any commercial products or services.