



The TTEP Quarterly

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



EPA Evaluating Handheld Detectors for First Responders

Responding to an accident, fire, or deliberately caused chemical release can expose first responders to hazardous conditions, including air containing reduced levels of oxygen (O_2), or harmful levels of toxic or corrosive chemicals. First responders and emergency management professionals need reliable, sensitive, and portable monitoring devices that can rapidly indicate the presence of multiple chemical and environmental hazards at the same time. EPA's National Homeland Security Research Center (NHSRC) is supporting EPA's Regional On-Scene Coordinators and response teams and state and local emergency response agencies by evaluating technologies to meet this need. Currently, NHSRC is evaluating handheld commercially available detectors designed to rapidly assess multiple hazards such as an oxygen deficient environment and the presence of toxic industrial chemicals (TICs) at potentially harmful concentrations.

The performance of seven handheld detectors capable of detecting O_2 , flammable mixtures (in terms of percentage of the lower explosive limit [LEL]), and multiple TICs at concentrations

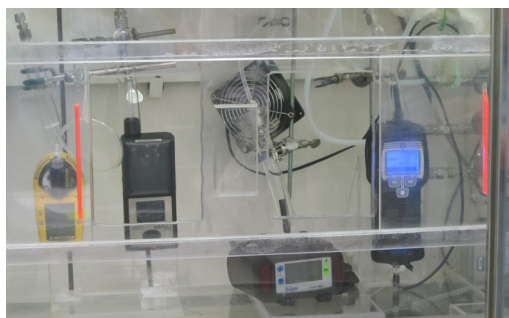
that would present a threat to emergency response personnel will be assessed. The handheld detectors can measure multiple analytes at one time; typically they provide an alarm if any measured target gas is present at hazardous levels (e.g., low O_2 , dangerous level of a TIC) and display a quantitative reading for each target gas (e.g., % O_2 , ppm of a TIC).

The handheld detectors will be evaluated on the following parameters:

- Response and Recovery Time
- Repeatability and Accuracy
- Response Threshold (i.e., detection limit)
- Effect of Operating Conditions (temperature and relative humidity)
- Cold/Hot Start Behavior
- Interference Effects
- Battery Life
- Operational Factors

This technology evaluation is being conducted at Battelle laboratories in

Columbus, Ohio. The evaluation is planned to be completed by August 2011 with reports expected to be available in early 2012. For more information, contact Dr. Shannon Serre at Serre.Shannon@epa.gov or at 919-541-3817.



TIC detectors undergoing testing in laboratory hood.

Handheld Detectors Under Evaluation

Handheld Detector	Multigas Capacity	Target Gases Detected							
		O_2	VOCs	H_2S	SO_2	NH_3	Cl_2	PH_3	HCN
Draeger XAM 7000	Up to 5 gases	✓	✓	✓	✓	✓	✓	✓	✓
RAE Systems MultiRAE Pro	O_2 , LEL, + 2 TICs	✓	✓	✓	✓	✓	✓	✓	✓
Sperian PHD6	O_2 , LEL, + 3 TICs	✓	✓	✓	✓	✓	✓	✓	✓
Industrial Scientific IBRID MX6	Up to 5 gases	✓	✓	✓	✓	✓	✓	✓	✓
BW Technologies GasAlert Micro 5	O_2 , LEL, + 1 TIC	✓	✓	✓	✓	✓	✓	✓	✓
RKI Instruments EAGLE 2	Up to 4 gases	✓	✓	✓	✓	✓	✓	✓	✓
EnviroNics ChemPro 100i	6 TICs	ND	ND	✓	✓	✓	✓	✓	✓

ND = Not detected by this detector

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/nhsrcttep.html. Questions about TTEP should be directed to Mr. Eric Koglin (koglin.eric@epa.gov or 702-798-2332).

Impact of Sediments on Decontamination of Drinking Water Storage Facilities

Among concerns with terrorist attacks on the nation's water and wastewater infrastructure is the adsorption of chemical, biological, or radiological (CBR) contaminants to sediments in drinking water storage tanks and reservoirs. Sediments can serve as sinks for contaminants. Therefore, adhesion to sediment particles following the introduction of CBR agents must be taken into account when developing treatment and decontamination strategies.

Water storage facilities are used to store water from wells or water treatment facilities at times when demands for water are low for use during periods of high demand. Storage facilities may consist of large reservoirs behind dams (impoundments) or service storage reservoirs located at water treatment plants or at various places in

distribution systems. Operational service storage tanks in distribution systems may include clear wells, pressure tanks, elevated tanks, ground level tanks or reservoirs, or underground facilities.

NHSRC is currently investigating the adsorption of selected contaminants (with a range of adsorptive properties) onto water storage tank sediments. Potential contaminants to be studied include cesium, iodide, *Bacillus anthracis* surrogate bacteria (e.g., *Bacillus globigii*), and pesticides. Tank sediments will be collected from actual storage facilities across the United States and analyzed for various parameters (particle size, pH, nutrients, etc.) and background concentrations of the contaminants of interest. The adherence of the target contaminants will be evaluated separately in three selected sediment samples and in as many as four unique drinking water matrices. The adherence experiments

will reveal the propensity of each contaminant to adhere to different sediment/water combinations.

Experimental work is expected to begin in July, with results available for public dissemination in early 2012. Information generated from this work should prove useful to water utilities and other decision-makers in assessing impacts of an event and selecting effective methods for handling contaminated sediments and decontaminating storage facilities.

For additional information, contact Scott Minamyer, EPA, at Minamyer.Scott@epa.gov or 513-569-7175.



Evaluation of Electrochemically Generated Antimicrobial Solution for Inactivation of *Bacillus anthracis* Spores on Surfaces

EPA is investigating the use of an antimicrobial solution generated from a commercial system to decontaminate buildings or outdoor areas contaminated with biological agents such as *Bacillus anthracis*. The solution has been used by the military, and has the potential to be scaled up to quickly produce large quantities of decontaminant which may be needed in a wide area release of a biological agent.

A commercially available system (EcaFlo Model No. C-102 offered by Integrated Environmental Technologies, Little River, SC) is being used to generate the antimicrobial solution. The solution is generated by passing an electrical current through a solution of salt water; hypochlorous acid is the key active ingredient.

The objectives of this investigation are to (1) evaluate the effect of the EcaFlo system operating conditions and time on antimicrobial solution composition and (2) determine the efficacy of these optimized antimicrobial solutions generated

by the EcaFlo system for inactivating spores of *B. anthracis* and *B. subtilis* on a range of materials. Representative building and outdoor materials being used in this investigation include industrial-grade carpet, decorative laminate, galvanized metal ductwork, painted wallboard paper, bare pine wood, and glass. Testing is under ambient conditions at a laboratory scale.

Testing is underway and a draft report will be prepared by August 2011 with public release expected in early 2012. The investigation will provide high-quality peer-reviewed data useful to EPA, remediation professionals, and decontamination decision-makers on the efficacy of this system against biological agents on building and outdoor materials. For additional information on this work, contact Joseph Wood, EPA, at Wood.Joe@epa.gov or 919-541-5029.



EcaFlo Model No. C-102