The Detector

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Newsletter of U.S. EPA's Safe Buildings Monitoring and Detection Technology Verification Program

What is ETV?

The U.S. Environmental Protection Agency (EPA) established the Environmental Technology Verification (ETV) Program in 1995 to verify the performance of innovative technical solutions to problems that threaten human health or the environment.

ETV's mission is to accelerate the use of new environmental technologies in the domestic and international marketplace.

ETV provides third-party, quality-assured performance data so buyers and users of environmental technologies can make informed purchase and application decisions.

ETV works through public/private testing partnerships (called Centers) to evaluate the performance of environmental technologies.

The program

The Safe Buildings Monitoring and Detection Technology Verification Program is part of the U.S. EPA's National Homeland Security Research Center (NHSRC). The program operates under the auspices of ETV to verify technologies that monitor and detect chemical and biological contaminants in buildings and public places.

The Safe Buildings Monitoring and Detection Technology Verification Program develops test plans and protocols, conducts verification tests, and reports the technologies' performance.

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Stakeholders Help To Select Next Technology Category for Testing

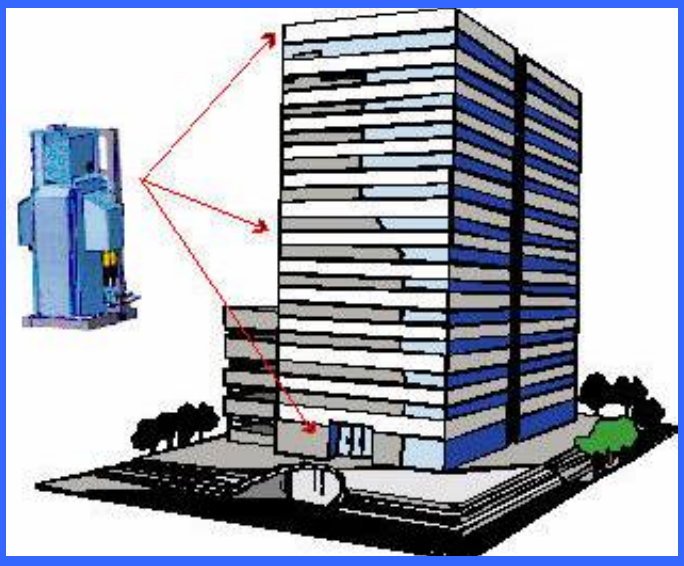
Several types of technologies capable of detecting chemical and biological agents in buildings and other structures are being considered for the second verification test by Battelle in collaboration with the U.S. EPA's Safe Buildings Monitoring and Detection Technology Verification Program.

Members of the program's stakeholder committee helped Battelle identify and prioritize the technologies for testing during a September teleconference and continued that support when members met in December. The meeting's major objectives were to review the lessons learned from conducting the first test of a detection technology, discuss the initial and ongoing survey to identify potential detection technologies, and prioritize them for future testing. Two stakeholders presented background information about the challenges of current biological and chemical technologies. Battelle staff members described the initial verification test, vendor survey, and technology priorities.

➢ Dr. Cynthia Bruckner-Lea of the Pacific Northwest National Laboratory described different pathogen detection approaches. Examples include: selective

(See Next Technology on Page 2)

The first test of an ion mobility spectrometer (IMS), submitted by Bruker Daltonics, was completed in December. The draft test report will be reviewed by stakeholder volunteers and U.S. EPA representatives.



Various technologies to detect chemical and biological contaminants in buildings and other public places were identified in the initial survey.

Next Technology *(from Page 1)*

identification (DNA/RNA [interior]; proteins/glycoproteins [exterior]); semi-selective broad spectrum detection of metabolites and lipids (physical properties, semi-selective sensors that decrease false positives); or function-based (pathogen's effect on organisms, tissues, or cells).

She defined pathogens as a complex package of chemicals and described the requirements of a biodetection system. She also gave examples of pathogen detectors currently available or in development and described factors to consider when evaluating a biodetection system.

➢ Dr. Don Stedman, of the University of Denver's Department of Chemistry, described his skepticism about accurately detecting chemical or biological agents. He noted that there are lists of possible detectors but no tests or evaluations are posted to support the claims. He also discussed the challenges facing users of detectors and advised that the detectors should be tested in real-world situations with a multitude of realistic interferences.

➢ Kent Hofacre, Battelle's verification test coordinator, described the status of testing of the first detection technology to be verified, the Bruker RAID-M, an ion mobility spectrometer. The purpose of the test was to characterize the detector's performance with five selected toxic industrial chemicals (TICs) and two chemical warfare (CW) agents at concentrations up to *Immediately Dangerous to Life and Health (IDLH)* levels, under a range of environmental conditions.

The parameters tested included response time, response threshold, repeatability, accuracy, recovery time, temperature/relative humidity effects, interferents effects, cold start behavior, battery operation, and other operational factors. Data are being analyzed as the first step in preparing the draft test report, which will be submitted to vendor representatives, volunteers from the committee, peer reviewers, and U.S. EPA personnel for review and comment.

➢ Dr. Tom Kelly, Battelle's verification testing leader, described the technology survey process and the need to prioritize the technologies for testing. The initial survey identified 268 chemical detection technologies that were available for possible testing. He said that this list of detection technologies was based in part on detector databases that can be obtained from federal agencies. Initially, the focus was on detectors that are durable and portable (especially for first responders), that can detect TICs, and that are small enough to fit within a test apparatus under a testing hood.

Stakeholders recommended that Battelle also begin (1) to prepare a protocol for technologies that can detect biological warfare agents and (2) to test those technologies. They also suggested the following technology priorities:

High priority—infrared detectors, other IMS technologies, flame photometric detectors, and biodetectors such as field polymerase chain reaction (PCR) technologies.

Medium priority—surface acoustic wave (SAW), mini-CAD, field gas chromatography with mass spectrometric detection (GC/MS).

Low priority—colormetric tubes.

Meet the Stakeholders

Thomas H. Taylor, Jr. Center for Disease Control & Prevention (CDC)

Tom Taylor is a mathematical statistician in the Bacterial and Mycotic Diseases Branch of the National Center for Infectious Diseases at the CDC in Atlanta, GA. He is a registered professional engineer (industrial), holds a B.S. in applied mathematics from the Georgia Institute of Technology, and an M.S. from the Georgia State University's College of Business in decision sciences, with a statistics concentration. Mr. Taylor's engineering and statistical experience ranges from specifying data-gathering instrumentation for a water treatment plant in Texas to developing a new mathematical approach to bio-assay interpretation currently being reviewed by the U.S. Patent Office. His role at the CDC is to support outbreak investigations and research on food-borne, mycotic, and respiratory diseases, as well as meningitis and selected pathogens. His primary responsibility is to anthrax and its causes (e.g., Bacillus anthracis). In the context of the anthrax medical study of serum, he has applied ground-breaking techniques to the mathematical and statistical interpretation of the bio-assay results. Mr. Taylor conducts seminars about multi-variable regression modeling for his division's epidemiologists and trains statistical analysts. He co-authored publications on infectious diseases, has a manuscript accepted for future publication, and is a regular reviewer of statistical portions of manuscripts submitted to *Emerging Infectious Diseases*.