

The TTEP Quarterly

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“Bird Flu” and Variola Virus Persistence and Decontamination

TTEP recently completed laboratory testing with the highly pathogenic avian influenza H5N1 virus (the etiologic agent of “bird flu”) and the vaccinia virus (a surrogate for the variola virus, which causes smallpox) related to their persistence in the environment and the efficacy of various liquids to inactivate the viruses or render them nonviable. Determining the extent to which viruses will remain viable on surfaces following a period of exposure to typical environmental conditions (i.e., persistence) or an application of a decontamination technology provides important information on the potential for subsequent human exposure.

Several aspects of the investigation advanced the fields of persistence testing and decontamination technology evaluations. For example, ultraviolet light (UV-A and UV-B only) was incorporated into some of the H5N1 virus persistence testing to simulate natural sunlight, and longer exposure durations of up to 56 days were incorporated into some of the vaccinia virus persistence tests. In addition,

because the variola smallpox virus is easily transportable in a temperature-stable, freeze-dried state, tests with the vaccinia virus were conducted to mimic these conditions. The vaccinia virus was applied to building material coupons as an aqueous suspension and then the coupons containing that suspension were freeze-dried. The



coupons were then exposed to various environmental conditions (room and low temperature, high and low relative humidity).

Testing with the H5N1 virus focused on materials

typically found outdoors at a poultry farm (chicken feces, galvanized metal, glass, and soil) and typical outdoor environmental conditions, given that this virus is often associated with poultry. Following exposure durations ranging from 1 to 13 days, the H5N1 virus was extracted from the coupons and the viable virus that remained was determined through standard viral enumeration techniques (see results table, next page).

See Persistence & Decontamination next page

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 the safety of the public in buildings and other structures. The National Homeland Security Research Center under EPA's Office of Research and Development has established the Technology Testing and Evaluation Program (TTEP) to assist this effort. TTEP is conducting 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).

Persistence & Decontamination (cont.)

Liquid decontamination testing with the H5N1 virus was conducted with 1% citric acid, pH-amended bleach (pH lowered to approximately 7), a hospital- grade quaternary ammonium compound, and 8% sodium carbonate. These chemicals were selected because they are expected to be readily available for use and amenable for wide-area decontaminations. The H5N1 virus was spiked onto galvanized metal and soil coupons and exposed to the decontamination liquid for 10 minutes.

The persistence of the vaccinia virus was investigated after initially being freeze-dried on glass, galvanized metal,

painted cinder block, and industrial carpet. The decontamination efficacy of 1% citric acid and the quaternary ammonium compound in inactivating the vaccinia virus was evaluated.

Two TTEP evaluation reports (one focused on the H5N1 virus and one focuses on the vaccinia virus) will be forthcoming and posted on the EPA NHSRC website (www.epa.gov/nhsrc). For more information about this testing, please contact Mr. Joseph Wood (wood.joe@epa.gov or 919-541-5029).

Attention Vendors: Technology Information Needed

The EPA's NHSRC is gathering existing technology product and performance information for existing, new, and emerging technologies relevant to the detection, decontamination, remediation and sampling of water treatment infrastructure, building materials and structures, outdoor areas, and indoor air for chemical, biological, and radiological warfare agents. These information summaries will be based on vendor provided data and will be offered for use to emergency responders, consequence managers, and water utility operators. If you would like to participate in this voluntary effort, please send the name, phone number, and email address of an appropriate person who can be contacted for additional information regarding your technology to bcotteptechinfo@battelle.org. For additional information, please contact Mary Schrock at 614-424-4976.

Persistence and Decontamination of VX on Surface Materials

TTEP has been evaluating decontamination strategies for environmentally persistent chemical agents. Previous technology evaluations have been conducted under relatively short surface aging times (minutes to hours) for chemical agents. As part of a new TTEP evaluation that will be conducted over the next several months, Battelle will evaluate the effect of chemical agent (VX) surface aging for time periods of days to weeks on decontamination efficiency. Decontamination technologies to be evaluated include bleach, caustic cleaner (i.e., ZEP Industrial Purple®) and hydrogen peroxide cleaner (i.e., Oxiclean® Versatile).

VX will be applied to interior building material surfaces and allowed to age for as long as three weeks after which the persistence will be determined as well as the efficacy of various decontamination approaches (listed above). This will provide the EPA with valuable information on how to best treat and decontaminate buildings contaminated with VX. For more information on this evaluation, contact Dr. Sang Don Lee (sangdon@epa.gov or 919-541-4531).

Evaluation of Online Total Organic Carbon (TOC) Analyzers and Ultraviolet (UV) Spectrometers

This evaluation will be conducted during Summer 2009 and include the following technologies:

TOC Analyzers

GE-Sievers 900 Portable
OI Analytical 9210m

UV Spectrometers

Real-Tech Real UV254 Security
s::can Spectrolyzer

For more information, please contact Dr. Shannon Serre (919-541-3817 or serre.shannon@epa.gov) or Dr. Ryan James (614-424-7954 or jamesr@battelle.org).



Participating technologies shown connected to EPA's portable pipe loop.