Gaseous Decontamination

Advanced modified vaporized hydrogen peroxide

Summary of some of the development, tests, demonstrations, etc.

M2DCON™

We are dedicated to serving those who protect and serve others

by providing innovative and proven decontamination technology.

It's more than just products –

it's understanding the mission requirements and then providing the best solutions for the job.

M2DCON™

Decontamination/Restoration of US Department of State postal facility contaminated with Anthrax

M2DCON

We believe that it is more than just products, it's understanding the mission requirements and then providing the best tools to achieve mission success.

Sometimes life sets us on a path….

Almost 20 years ago there was anthrax attacks in the US. The call for decontamination technology to counter the attack was issued. Industry answered by rapidly upgrading and adapting commercial technology to address the problem.

As a direct result a team dedicated themselves to addressing chemical and biological decontamination threats was established by an Ohio company.

This team developed numerous technologies including multiple generations of vaporized hydrogen peroxide decontamination systems to demonstrate efficacy, scalability, dependability, etc.

Today the heart of M2DCON is made of this team and we continue to search for the best solutions for decontamination of chemical and biological threats.

Evolution of Gaseous Decontamination Systems (GDS/mVHP) For Chemical and Biological Decontamination

SA-32 Anthrax Decontamination

C-141 Cargo Aircraft Demo

F-16 Interior/ Exterior Demo

Aircraft Decontamination Field Demonstrations TCRWADS & JSF

GDS Regen – Sensitive Equipment Decontamination

GSA 410 Anthrax Decontamination

Modular Building System Demo

HMMWV-Mounted Mobile System

FMTV-Mounted Mobile System

SEDS

Small SEDS

Testing of Naval System on the TS Golden Bear

Field Forward CBDS for SOF

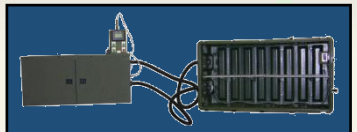
Mobile GDS

Live agent testing (VX, HD, GD, TGD)

Development of mVHP® (Patent #7,102,052) with U.S. Army's Edgewood Chemical Biological Center

CRADA established with ECBC

Live agent testing in mock SEDS chamber



SOC CBDU - Prototype

MiniGDS

GDS-CL for Commercial Laboratories and Processing Facilities

2002 - 2005 ***2005 - 2010*** ***2010 - 2015*** ***2015 - 2021***

Knowledge into action…

Our team has a reputation for Rapid Development and Deployment…

- Scalability of current technologies and equipment
- Reformulating to meet emerging threats
- Customizing for improved performance

Decontamination Products

Chemistries

- Decon PLUS™ (Joint General Purpose Decontaminant/M333)*
- SSDX-12™
- Fuller's Earth
- K9 Decon Wipes (coming Summer 2022)

Wipes

- CBR Multi-Purpose Wipes (Joint Service Equipment Wipe/M334 Equivalent)*
- SSDX™ Dry Decon
- DCON Mitt (all hazard microfiber mitt)

Equipment

- GDS Field+™ (Chem Bio Decon System)
- GDS SEDS™ (Sensitive Equipment Decontamination System)*
- Mobile GDS
- GDS-CL (Pharma/Research Labs)
- SafePass GDS™

Kits

- COMIT™ IPDK (Interdependent Personnel Decon Kit)
- COMIT ESDK (Electrostatic Decon Kit)
- TEK-TAK™ System (Technical & Tactical Decon Kit System)
- FDNY Personnel Modesty Kit
- FDNY Dry Decon Kit

Line Supplies

- ChemBarrier Ground Cover
- ChemBarrier Medical Liter Cover
- ChemBarrier Retention Pool/Pit
- ChemBarrier Tool Belt
- ChemBarrier Bags

*programs of records/acquisition programs

Modified Vaporized Hydrogen Peroxide
Current Products

mVHP is can be adapted to meet unique mission requirements with a proven track record in defense and commercial markets

Field GDS+

The **Field GDS+** is an advanced portable **chemical/biological decontamination** system suitable to decontaminate sensitive equipment, land vehicles and small to medium interiors.

The Field GDS+ is capable of vaporizing a liquid stream and combining it with a gaseous stream to meet existing and emerging threats. In short the GDS+ has the **ability to evolve to meet new threats**.

The **advanced and intelligent system** provides the user with a robust and **easy to use** decontamination system.

The system includes:

- GDS+ decontamination module in shipping case with slide out rack for easy maintenance access
- Dual-use shipping container for transporting the system and serving as a decontamination enclosure
- Set of cables and hoses
- Operator interface
- Enhanced Sensor Bundle
- Chem-Bio Filter Cradle
- Aeration unit
- Power Inverter

Note: Consumables are obtained separately. Dehumidifier available as option.

GDS - SEDS

The M2DCON ruggedized Gaseous Decontamination System for Service Equipment Decontamination (GDS - SEDS) is a decontamination system suitable for decontaminating sensitive and non-sensitive equipment using VHP and mVHP to inactivate biological and chemical agents. The system is designed for use on a decontamination line.

The decontaminant used in the GDS-SEDS is modified Vaporized Hydrogen Peroxide (mVHP). This decontamination process was developed in conjunction with the extensive research, expertise and collaboration of members of the M2DCON team with ECBC during execution of the CRADA.

The system can be operational within minutes. Once the unit is placed on the decontamination line, it can be operated by one person. The system is preprogrammed with the decontamination cycle.

Once set up is complete, one-button operation is initiated by selecting the desired cycle. From that point on, the cycle is entirely automated based on feedback from the sensor positioned within the space.

GDS-CL™

The M2DCON Gaseous Decontamination Systems for Compounding Laboratories (GDS-CL) is an advanced hydrogen peroxide vapor (HPV) decontamination system optimized with proprietary CoolFlow™ to provide improved ability to meet stringent temperature requirements for items being processed.

GDS-CL are ideal for operations requiring rapid and effective bioburden reduction on materials before entering cleanroom spaces.

The systems offer a short cycle time, a high-level reliability, minimal maintenance and user-friendly operation. They are available in both fixed location and mobile versions, providing optimal flexibility to enhance your daily workflow.

The GDS-CL was recently selected by an international company for use in their compounding pharmacies.

SafePass GDS™

Fewer operation interventions reduces labor, streamlines operations and maintains material cleanliness.

The M2DCON SafePass GDS (Gaseous Decontamination System) uses dry hydrogen peroxide vapor (HPV) which is ideal for operations requiring rapid and effective bioburden reduction on materials before entering cleanroom spaces. The systems offer a short cycle time, a high-level reliability, minimal maintenance and user-friendly operation.

SafePass GDS is a fixed location system which integrates into the cleanroom and facilitates directional movement of materials into the clean environment via interlocking doors. The systems are scalable and customizable to meet your specific requirements. Proprietary CoolFlow™ technology provides dry, non-condensing hydrogen peroxide vapor (HPV) decontamination with the ability to meet the stringent temperature requirements for items being processed. SafePass GDS provides optimal flexibility to enhance your daily workflow.

- Flexible Load Configurations with adjustable shelves to accommodate varying loading patterns
- Each shelf can hold six (6) polypropylene baskets for processing materials
- Each Basket Can Hold:
  - Four (4) 500mL IV bags,
  - Four (4) 1L IV bags,
  - Ninety-Six (96) 22mm x 50mm vials, or
  - Forty (40) 45mm x 110mm vials.

Transport GDS™

Transport GDS is a mobile system which can be loaded, processed and then transferred between areas without requiring redundant material sanitization activities or excessive material handling, while maintaining the integrity of the material environment.

- Loadable volume is 0.46m^3
- Flexible Load Configurations
    - Adjustable shelves to accommodate varying loading patterns
- Polypropylene baskets hold materials two (2) per shelf
    - Multiple styles commercially available
- Each Basket Can Hold:
    - Four (4) 500mL IV bags,
    - Four (4) 1L IV bags,
    - Ninety-Six (96) 22mm x 50mm vials, or
    - Forty (40) 45mm x 110mm vials.

GDS *Regen*™

The **GDS *Regen*** is an advanced field forward **biological decontamination** system suitable to decontaminate PPE and sensitive equipment. This next generation decontamination system generates **vaporous hydrogen peroxide** to decontaminate biological threats. **Advanced sensors** combined with **intelligent automation** monitor and provide feedback to control the conditions within the decontamination enclosure and **ensure cycle repeatability.** The system employs **Next-Gen Aeration™** technology to optimize and reduce cycle duration. **The GDS *Regen*** is the result of twenty years experience building VHP™/mVHP™ Systems for the US DoD.

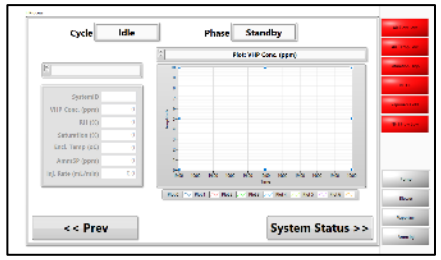
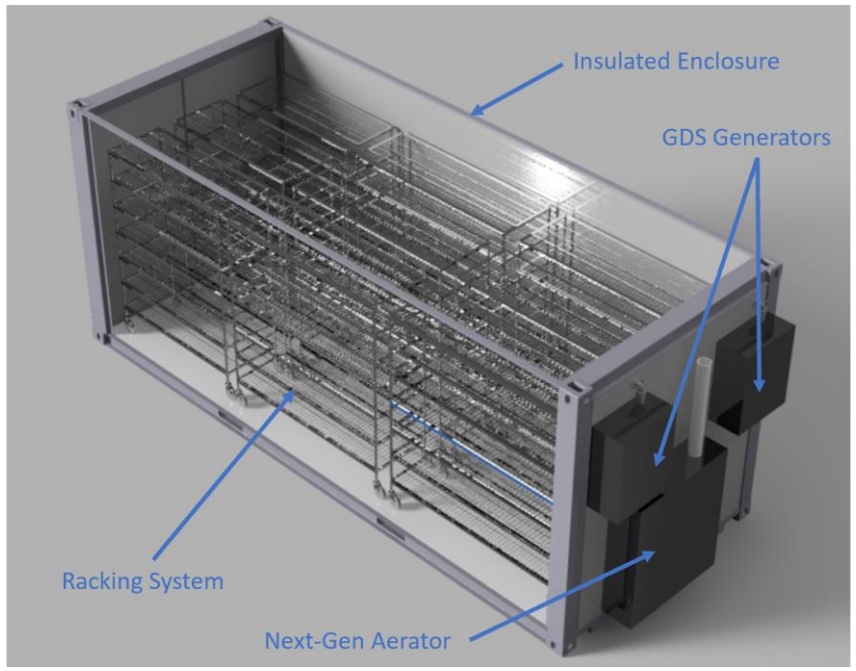


Image (left) of control panel for operations of the system.

Image (Below) showing asymmetric view of system



The system includes:

- Dual GDS generators
- HMI operator panel for controllers interface
- Sensor bundles monitoring Temperature, Relative Humidity and Vaporous hydrogen peroxide concentration
- Integrated Next-Gen Aeration system
- Stainless Steel Racking system to maximize processing
- Insulated 20 ft CONEX decontamination enclosure

GDS Regen is available with 20 ft or 10 ft decontamination enclosure. It is also available in a lab scale with a 2 ft decon enclosure

This product has not been reviewed by US regulatory.

Mobile GDS (Gaseous Decon System)

The **Mobile GDS** is an advanced automated and energy efficient dry vapor phase hydrogen peroxide (VPHP) sterilization system for room decontamination. Multiple Mobile GDS system can be networked to work together to decontaminate larger spaces accordingly.

The first generation Mobile GDS was developed as a Naval Transport Decontamination System (NTDS) and was successfully tested at sea aboard the California Maritime Institutes' TS Golden Bear

The fully automated system is design for ease of transport and operations.

Mobile GDS with ZUMRO Shelters

The M2DCON Mobile GDS can be placed inside a soft-sided shelter allowing for decontamination of sensitive equipment, vehicles, etc.

M2DCON GDS can be customized to a specific shelter to meet mission requirements.

Modified Vaporized Hydrogen Peroxide Efficacy and Material Compatibility Testing

Modified Vaporized Hydrogen Peroxide Efficacy Testing

Biological Efficacy

- Testing was performed by ECBC, Dugway Proving Grounds, NASA's Jet Propulsion Laboratory and JSF
- VHP was shown to be effective against *B. anthracis* and a variety of biological agent surrogates including: *G. stearothermophilus, B. thuringiensis, B. antropheus* and *Yersinia ruckeri* on a variety of surfaces

Chemical Efficacy

- Laboratory and surety chamber testing was performed in conjunction with DEVCOM CBC
- mVHP was shown to be effective against GD, HD, and VX agents on a variety of surfaces

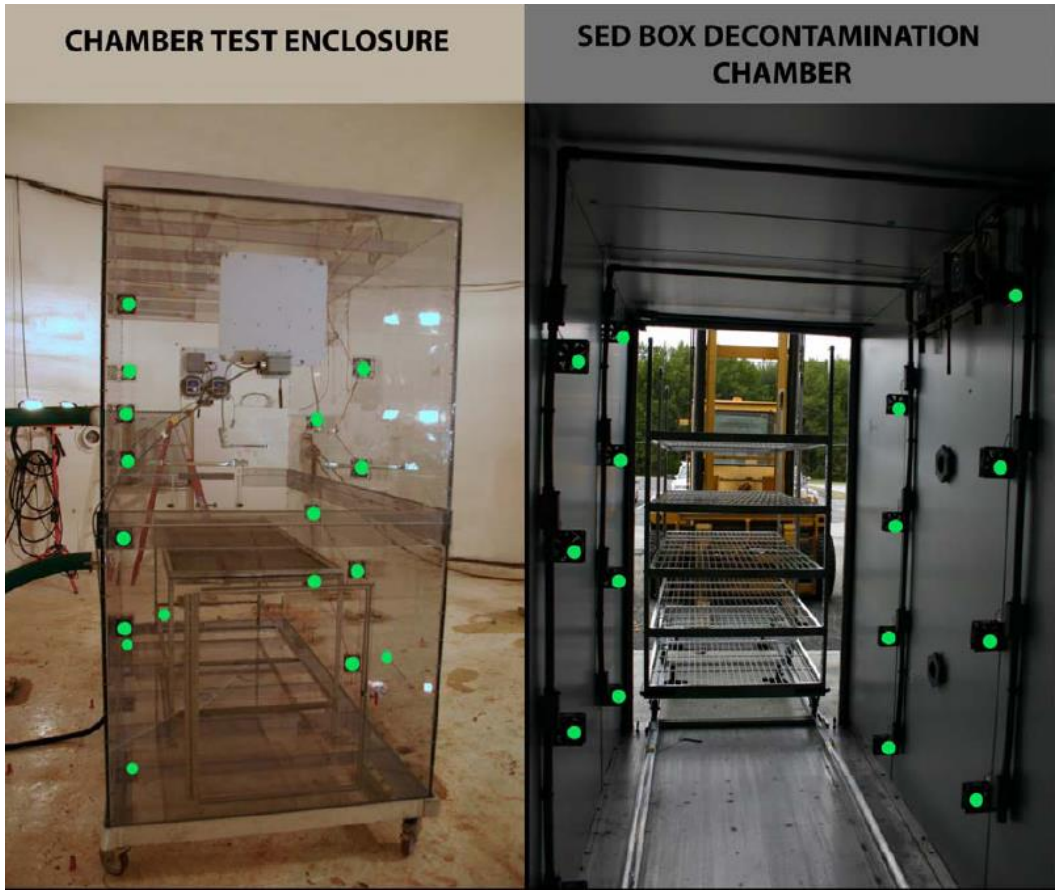
Modified Vaporized Hydrogen Peroxide Efficacy Testing

Sensitive Equipment Decontamination System (SEDS) Mockup at Edgewood Chemical Biological Center, 2005 – 2006

Successfully neutralized:

- Chem Agents
  - HD
  - GD
  - Thickened GD
  - VX
- Bio Agents
  - *G. stearothermophilus*
  - *B. anthracis*

T. Lalain et. al., “Evaluation of the STERIS Sensitive Equipment Decontamination (SED) Apparatus on a 463L Pallet," ECBC-TR-MS-3162, 2006.



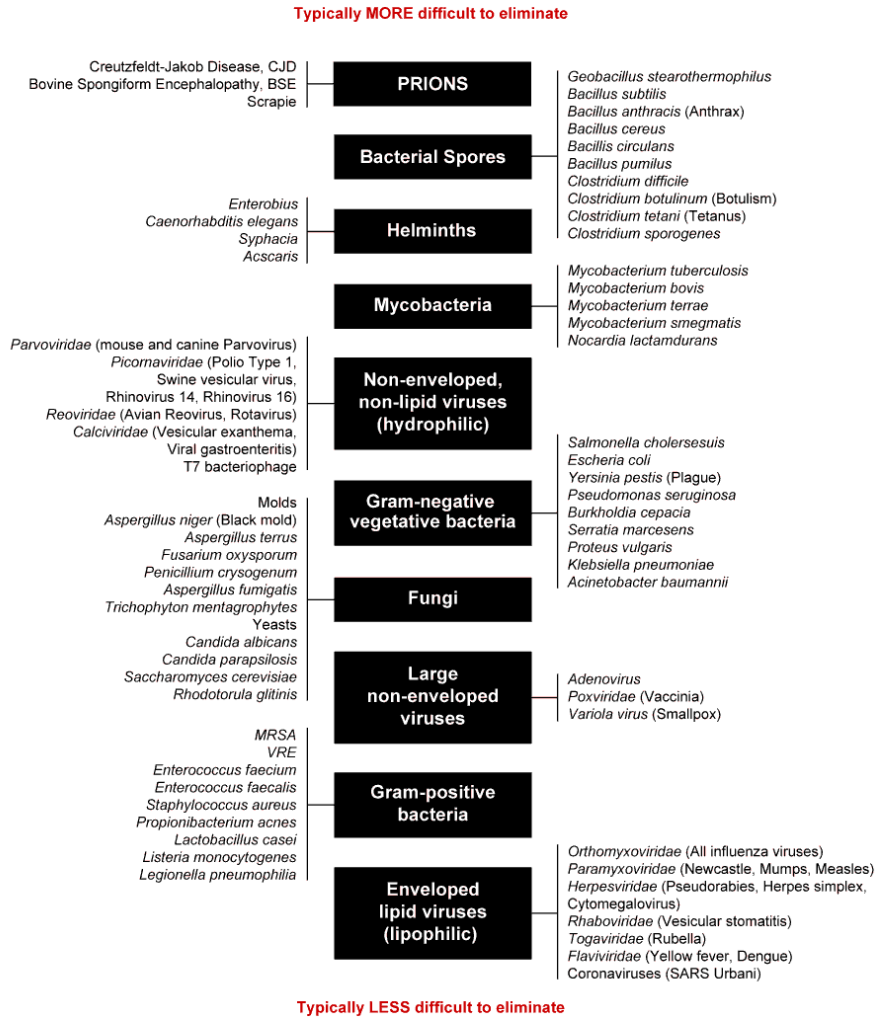
Green dots indicate circulation fan positions

Vaporized Hydrogen Peroxide Biological Efficacy

VHP is a broad-spectrum antimicrobial. Government reports confirm efficacy of VHP against biological warfare agents. Other published studies demonstrate VHP inactivation of a broad spectrum of microorganisms (prions to viruses).

Testing at ECBC shows, when used as directed, VHP decontaminates 10^6 anthrax spores in less than five minutes.

ECBC TR-MS-3160



Modified Vaporized Hydrogen Peroxide Chemical Efficacy Testing for Residual Agent

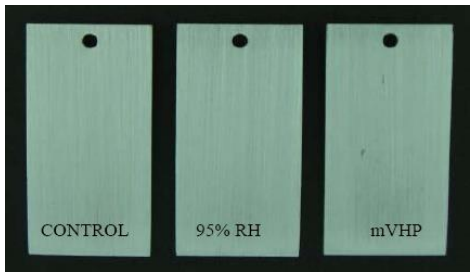
ECBC testing shows mVHP rapidly decontaminates chemical agents. The decontamination of chemical agent can be increased by extending exposure time.

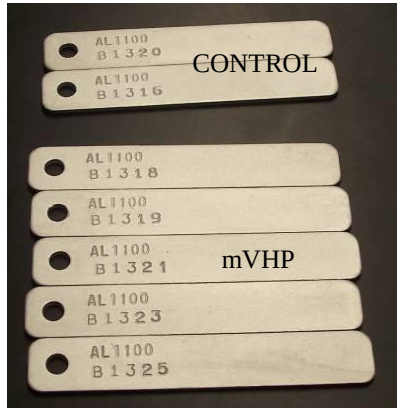
Data from ECBC TR-896

Modified Vaporized Hydrogen Peroxide Materials Compatibility Testing

Air Force Research Lab / METSS (Wright Patterson AFB, OH)

- Aluminum 2024
- Aluminum 7050
- Aluminum 7075
- 4340 Steel
- Stainless Steel 303 CRES
- Stainless Steel 15-5 PH
- Stainless Steel 300M
- Kapton® wire insulation
- Nomex® flexible insulation
- JSF OML Substrate with Topcoat
- Polysulfide Sealant (Chromated and non-chromated)
- JSF and F-16 Applique on Composite Substrate
- Wiring (MIL-W-81381, MIL-W-22759)
- Encapsulated printed circuit boards
- MIL-C-85285 Polyurethane Topcoat Paint
- Rain Erosion Coating (FP-240F and LMA-MR173)
- Ti-6Al-4V
- Ti-10V-2Fe-3AL
- Acrylic
- Polycarbonate
- Insulfab® 330 Film
- Silicone (sheet and closed cell)
- Nylon reinforced Rubber (Tire)
- Nitrile Rubber O-Ring
- Mil-W-4088 Nylon Webbing
- Honeycomb composite wall panel
- Carbon Fiber /Epoxy Composite
- Carbon Fiber / Bismaleimide
- Thermoplastic Polyester 30% glass
- Self-sticking anti-skid patches
- Patching Tape
- APC Water-based Acrylic Paint





Reports

K. J. Heater, B. L. Grunden, T. Skidmore, “Modified Vapor Hydrogen Peroxide Testing of C-17 Interior Aircraft Materials.” US Air Force AFRL/HEPC, Wright-Patterson AFB, OH. July 2004.

K. Heater, D. Bigg, A. Theys, D. Badowski, A. Banks, J. Sanders, “Modified Vapor Hydrogen Peroxide Testing of Aircraft Materials.” US Air Force AFRL/HEPC, Wright-Patterson AFB, OH. June 2006.

US Air Force AFRL/HEPC tested mVHP effects on a wide range of aircraft materials.

Modified Vaporized Hydrogen Peroxide Decontamination of Sensitive Equipment

Key findings from 2005-2006 testing at ECBC:

- "Representative items of sensitive equipment were exposed to repeated mVHP cycles. All items remained functional..."
- "The mVHP SED prototype demonstrates the potential to decontaminate biological contamination on CARC-coated metal, glass, polycarbonate and silicone and meet both the JPID and JSSED ORD requirements."

ECBC-TR-MS-3162

Modified Vaporized Hydrogen Peroxide
Tests and Demonstrations

- **Anthrax Decontamination (large scale VHP, >1,000,000 cu. ft.)**
  - DOS SA-32 and GSA 410
- **NASA / ESA Certification of STERIS VHP for planetary protection**
- **JSF Adoption of STERIS VHP for biological decontamination**
- **Development of single gaseous chem/bio decontaminant - mVHP** (CRADA with ECBC)
- **Building and Aircraft mVHP demonstrations**
  - Building E3220 at ECBC
  - Military Aircraft – C141 (AMARC); F16 (AMARC); F16 (Edwards AFB/JSF pgm), C141 (AMARC)
  - Civilian Aircraft – DC-9 (FAA/CAMI – ACER Orlando); Boeing 747 (FAA/CAMI ACER)
- **Live Agent Chamber Tests**
  - 200 – 1000 cubic feet
  - GD, TGD, VX, HD and *B. anthracis*
  - Range of military relevant materials
- **Materials Compatibility**
  - AFRL - Three separate studies of mVHP at range of concentrations and temperatures
    - Materials tested identified by C-17 SPO – used in critical components of the airframe
  - NASA/JPL – materials for use in interplanetary probes
  - JSF – aircraft materials
- **Sensitive Equipment Compatibility testing**
  - ECBC – GPS, DVD players, Night vision monoculars, radio handsets, M40 Mask
  - JSF – Aircraft components and wiring

Modified Vaporized Hydrogen Peroxide Reports – Live Agent Decontamination

- McVey, “Final Report VHP Fumigation of GSA Building 410 Anacostia Naval Station, 2701 South Capitol Street, SE, Washington, DC.” Strategic Technology Enterprises, Inc., a subsidiary of STERIS Corporation, Mentor, OH, August 2003

- “Remedial Action Report for Department of State’s Diplomatic Pouch and Mail Facility (SA-32).” Strategic Technology Enterprises, Inc., a subsidiary of STERIS Corporation, Shaw Environmental & Infrastructure, Inc., and US Army Corps of Engineers, November 3, 2003

Modified Vaporized Hydrogen Peroxide Reports – Chemical Efficacy (mVHP)

- T. Lalain, M.D. Brickhouse, S. Gater, K. Williams, J. Hendershot, B. Mantooth and D. Stark, "Chemical Warfare Agent Decontamination Efficacy Testing: Large-Scale Chamber mVHP Decontamination System Evaluation, Part I: Comparison to ORD." ECBC-TR-MS-3163, U.S. Army Research, Development and Engineering Command, Edgewood Chemical Biological Center, Aberdeen Proving Ground, MD, Aug 15, 2006.

- "Test Plan for Modified Vaporized Hydrogen Peroxide (mVHP) Decontamination Efficacy Testing on an Interior Platform (**C-141 Starlifter**) at Davis Monthan Air Force Base (DMAFB)/Aerospace Maintenance and Regeneration Center (AMARC)." Prepared by the Research & Technology Directorate – Edgewood Chemical Biological Center Research, Development and Engineering Command, February 2006.

- M. Brickhouse, et al., "Decontamination of CBW Agents by mVHP: Demonstration of the CBW Decontamination of a Building Using mVHP." ECBC-TR-470S, U.S. Army Research, Development and Engineering Command, Edgewood Chemical Biological Center, Aberdeen Proving Ground, MD, June – Sept 2004

- MacIver et. al. "Developmental Test for Elevated Concentrations of Modified Vaporous Hydrogen Peroxide: Surface Efficacy Screening." Draft ECBC Technical report, 2009

Modified Vaporized Hydrogen Peroxide Reports – Biological Efficacy

- T. Lalain, M.D. Brickhouse, J. Pfarr, S. Gater, J. Hendershot, B. Mantooth and D. Stark, "Biological Warfare Agent Decontamination Efficacy Testing: Large-Scale Chamber mVHP Decontamination System Evaluation for Biological Contamination." ECBC-TR-MS-3160, U.S. Army Research, Development and Engineering Command, Edgewood Chemical Biological Center, Aberdeen Proving Ground, MD, Jul 30, 2006.

- G. Fichet, E. Comoy, C. Duval, K. Antloga, C. Dehen, A. Charbonnier, G. McDonnell, P. Brown, C. I. Lasmézas, and J. P. Deslys, "Novel Methods for Disinfection of Prion-Contaminated Medical Devices." Lancet 2004; 364: 521-26.

- R. Cahall, W. Carroll, and M. Shaw, "Live Fire Test #04C: Biological Decontamination Testing of a Cluttered **Joint Strike Fighter Electronics Bay Mockup**." TERN No. XG-SV-CB-04C-TR, CDRL A008 Volume 2.07A, Battelle Memorial Institute for the JSF Program Office System Development and Demonstration Program, 18 March 2005.

- "Live Fire Test #08: **Aircraft CB Survivability Systems** Test Risk Reduction Test Report." TERN No. XG-SV-CB-08-TR, CDRL A008 Volume 2.07A, JSF Program Office System Development and Demonstration Program, 18 March 2005.

Modified Vaporized Hydrogen Peroxide Reports – Biological Efficacy

- Johnson et al. “Potential use of Vaporized Hydrogen Peroxide (VHP) in the Inactivation of Toxins.” Abstract/Private Communication
- Rogers et al. “Vapour-phase hydrogen peroxide inactivates Yersinia pestis dried on polymenrs, steel and glass surfaces.” Lett App Microbiol 47(2008) pp 279-285.
- Kahnert et al.“Decontamination With Vaporized Hydrogen Peroxide is Effective Against *Mycobacterium tuberculosis.*“ Letters in Applied Microbiology 2005, Vol 40, pp 448-452.
- Heckert et al. “Efficacy of Vaporized Hydrogen Peroxide against Exotic Animal Viruses.” App Enviro Microbiol, Oct. 1997, pp3916-3918.
- A. McAnoy, et al. “Establishment of a Vaporous Hydrogen Peroxide Bio-Decontamination Capability.” Australian Government, Department of Defence, Human Protection Performance Division, Defence Science and Technology Organisation, Fishermans Bend, Victoria, Australia, February 2007

Modified Vaporized Hydrogen Peroxide Reports – Material Compatibility

- K. Heater, D. Bigg, A. Theys, D. Badowski, A. Banks, and J. Sanders, “Modified Vapor Hydrogen Peroxide **Testing of Aircraft Materials**.” METSS Corporation for USAF AFRL/HEPC-CBD, Wright-Patterson AFB, Dayton, OH, June 2006.

- K. Heater, B. Grunden, and T. Skidmore, “Modified Vapor Hydrogen Peroxide Testing of C-17 Interior Aircraft Materials.” METSS Corporation for USAF AFRL/HEPC-CBD, Wright-Patterson AFB, Dayton, OH, July 2004.

- “Live Fire Test #11C: **F-35 Airframe** System Materials Hardness to Biological Warfare Agent Decontamination with Vaporized Hydrogen Peroxide (VHP®).” TERN No. XG-SV-CB-11C-TR, CDRL A008 Volume 2.07A, Battelle Memorial Institute for the JSF Program Office System Development and Demonstration Program, 25 July 2007.

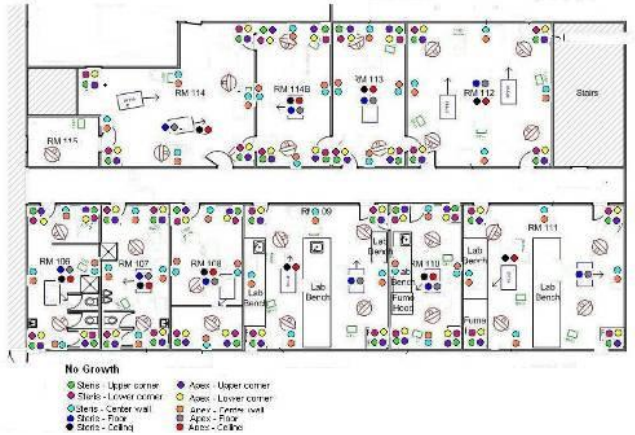
Modified Vaporized Hydrogen Peroxide Reports – Decontamination of Sensitive Equipment

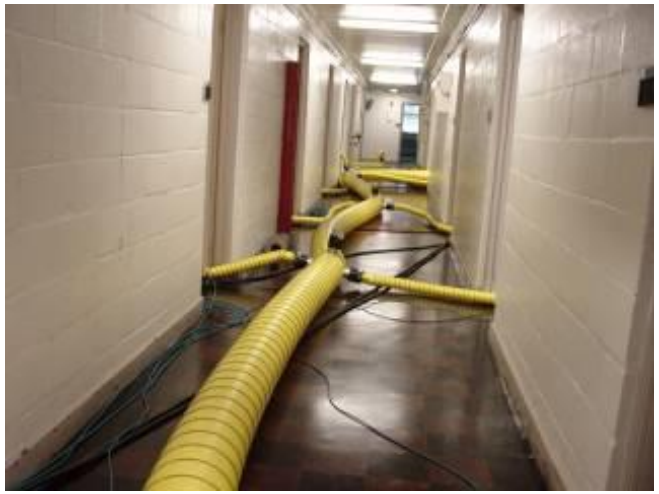
- T. Lalain, M.D. Brickhouse, J. Pfarr, J. Lloyd, J. Flowers, B. Mantooth, Z. Zander and D. Stark, “Evaluation of the STERIS Sensitive Equipment Decontamination (SED) Apparatus on a 463L Pallet.” ECBC-TR-MS-3162, U.S. Army Research, Development and Engineering Command, Edgewood Chemical Biological Center, Aberdeen Proving Ground, MD, Jul 31, 2006.

- M.D. Brickhouse, A. Turetsky, B. MacIver, J. Pfarr, I. McVey, W. Alter, J. Lloyd, M. Fonti Jr., “Vaporous Hydrogen Peroxide **decontamination of a C-141B** Starlifter Aircraft: Validation of VHP and mVHP Fumigation Decontamination Process via VHP-Sensor, Biological Indicator, and HD Simulant in a Large-scale Environment.” ECBC-TR-510S, U.S. Army Research, Development and Engineering Command, Edgewood Chemical Biological Center, Aberdeen Proving Ground, MD, 19 Sept 2005.

Modified Vaporized Hydrogen Peroxide Field Tests and Demonstrations

Demonstration of ECBC Office/Lab Complex (E3220)





Edgewood Chemical Biological Center (June – Sept 2004)

Decontamination Demonstration of a C-141 Cargo Aircraft

Demonstration of Interior and Exterior of an F16

Mid Avionics Bay

Forward Avionics Bay and Radome

Cold Air ECS

Hot Air ECS

Davis-Monthan Air Force Base (Sept – Oct 2005)

Demonstration of a C-141 with 2nd Gen Decon System

Davis Monthan Air Force Base (Feb – March 2006)

Prototype Sensitive Equipment Decon System (SEDS)

Tyndall AFB (2005)

Developed with ECBC for Limited Objective Experiment (LOE)

Naval Decontamination – Dockside testing using 2nd Gen CBDS

California Maritime Academy (Dec 2011)

Maturity of Modified Vaporized Hydrogen Peroxide

Program/Sponsor/ Location	Date(s)	Description
GSA 410, Washington DC	Jun – Oct 2002	Anthrax decontamination
SA-32, Sterling VA	Jun – Aug 2003	Anthrax decontamination
ECBC Initial CRADA Investigations	2002	Laboratory evaluations of chemical and biological efficacy
ECBC E3220	May – Sep 2004	Decontamination of a building – method development and validation using chemical and biological simulants
AMARC C141 – I	Oct – Dec 2004	Decontamination demonstration of a cargo aircraft, method development and validation using chemical and biological simulants – with ECBC
AMARC F16	Aug – Sep 2005	Decontamination demonstration of a tactical aircraft, method development and validation using biological simulants – with ECBC
AMARC C141 – II	Feb – Mar 2006	Decontamination demonstration of a cargo aircraft using a new decontamination system and validation using chemical and biological simulants – with ECBC

Maturity of Modified Vaporized Hydrogen Peroxide

Program/Sponsor/ Location	Date(s)	Description
ECBC Chambers Testing I	2003 – 2004	Effect of substrate materials on VHP efficacy and simulant validation testing in a 1000 cu ft chamber
ECBC Chambers Testing II – Bio	Oct 2005 – Mar 2006	Small enclosure (250 cu ft) decontamination method validation using biological agents (Anthrax)
ECBC Chambers Testing II – Chem	Mar – Aug 2006	Small enclosure (250 cu ft) decontamination method validation using chemical agents (HD,GD, VX)
AFRL/METSS Materials Compatibility I	Feb – July 2004	Materials compatibility testing of C17 materials
AFRL/METSS Materials Compatibility II	Jun 2005 – Jun 2006	Materials compatibility testing of aircraft materials
AFLR/METSS Materials Compatibility III	2007	Materials compatibility testing of aircraft materials
AFRL/METSS Materials Compatibility IV	2007	Aircraft materials compatibility screening at elevated temperatures

Maturity of Modified Vaporized Hydrogen Peroxide

Program/Sponsor/ Location	Date(s)	Description
Tyndall AFB, JSSED LOE	Jun 2005	Design and build model sensitive equipment decontamination system for participation in JSSED LOE
ECBC SEDS	Oct 2005 – Mar 2006	Sensitive equipment compatibility testing using dedicated sensitive equipment decontamination system, and decontamination validation using biological simulants
Edwards AFB, JSF F16	Oct 2005 – Feb 2006	Validation testing confirming VHP suitability for biological decontamination of the Joint Strike Fighter
JSF CB-04	Jan 2005	Biological decontamination testing of a cluttered JSF avionics bay mockup
JSF CB-08	Jan 2006	Aircraft CB survivability systems biological testing
JSF CB-11A	Apr 2006	F135 propulsion system materials compatibility testing
JSF CB-11B	Jun 2006	Live Fire Test – VHP decontamination of F-35 materials using a biological simulant
JSF CB-11C	Jun 2007	Live Fire Test – F-35 airframe system materials hardness to VHP decontamination

Maturity of Modified Vaporized Hydrogen Peroxide

Program/Sponsor/ Location	Date(s)	Description
Federal Aviation Administration/ACER – DC-9	May – Dec 2006	Development and demonstration of a process to decontaminate a DC-9 aircraft in conjunction with an AeroClave air handling system
Federal Aviation Administration/ACER – 747	Mar 2007	Decontamination demonstration of a Boeing 747-100 aircraft fuselage in conjunction with an AeroClave air handling system
Federal Aviation Administration/ACER – Rail	Mar 2007	Decontamination demonstration of a commuter rail car in conjunction with an AeroClave air handling system
NASA/Jet Propulsion Laboratory	Jun 2003 – 2008	Generation of lethality data for NASA certification of VHP for sterilization of spacecraft systems and subsystems

Maturity of Modified Vaporized Hydrogen Peroxide

Program/Sponsor/ Location	Date(s)	Description
HispanoVema (Zaragoza, Spain)	2011	CBDS integrated into mobile sensitive decontamination system for the Spanish Air Force
NAVSEA (USA)	2013	Provided commercial CBDS for Navy Special Forces
SOF RDDC (USA)	2016	Calibration and system upgrade of CBDS for NAVSEA and production of additional two systems.
Spanish Air Force (Zaragoza, Spain)	2018	Provided training and maintenance on CBDS

Maturity of Modified Vaporized Hydrogen Peroxide

Program/Sponsor/ Location	Date(s)	Description
ECS (Indiana, USA)	2018	MicroGDS decontamination system developed for integration into ECS biochambers for research laboratories
SOF RDDC	2018	Upgraded of three CBDS systems for SOF, production of an additional CBDS systems, and integration of CBDS with Battelle chamber for SEDS prototype
Compounding Pharmacy (Illinois, USA)	2019	Gaseous decontamination system integrated into Baker Glovebox
Healthcare Company (Illinois, USA)	2020	Rapid development and deployment of GDS Regen including regulatory IQ/OQ/PQ
Compounding Pharmacy (Australia)	2021	Family of Gaseous Decontamination Systems developed for installation of 17 facilities in Australia and New Zealand

Interaction with U.S. Department of Defense during the past 20 years

CB Defense Acquisition Community	Joint Program Executive Office for Chem Bio Defense (JPEO-CBD) Joint Program Manager for Decontamination (JPM Decon) Joint Program Manager for Collective Protection (JPM COLPRO) Joint Requirements Office (JRO)
Operations	Special Operations Command (SOCOM) Air Mobility Command (AMC TRANSCOM) Joint Strike Fighter Program Office (JSFPO) Chemical, Biological, Radiological, and Nuclear (CBRN) School
Military Medical	US Army Medical Research and Materiel Command (USAMRMC) US Army Medical Research Institute of Chemical Defense (USAMRICD) US Army Medical Research Institute of Infectious Diseases (USAMRIID) US Army Medical Materiel Development Activity (USAMMDA)
DoD Labs	US Army DEVCOM CBC (formerly ECBC) Air Force Research Laboratory (AFRL) US Army Natick Soldier Center
DoD Science & Technology	Defense Threat Reduction Agency Decon (DTRA)

We are dedicated to serving those who protect and serve others

by providing innovative and proven decontamination technology.

It's more than just products –

it's understanding the mission requirements and then providing the best solutions for the job.

Let us know how we can help

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