

AFRL-RX-TY-TP-2008-4558



**CHEM-BIO SELF-DECONTAMINATING
SURFACES (BRIEFING SLIDES)
AFRL QUARTERLY SUMMARY ON DARPA EFFORT**

**Joseph D. Wander
Air Force Research Laboratory**

**Brian Heimbuch, Kimberly O’Gurek
Applied Research Associates
P.O. Box 40128
Tyndall AFB, FL 32403**

DECEMBER 2007

Interim Report for 1 October 2007 – 5 December 2007

**DISTRIBUTION STATEMENT A: Approved for public release;
distribution unlimited.**

**AIRBASE TECHNOLOGIES DIVISION
MATERIALS AND MANUFACTURING DIRECTORATE
AIR FORCE RESEARCH LABORATORY
AIR FORCE MATERIEL COMMAND
139 BARNES DRIVE, SUITE 2
TYNDALL AIR FORCE BASE, FL 32403-5323**

REPORT DOCUMENTATION PAGE

*Form Approved
OMB No. 0704-0188*

The public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.

1. REPORT DATE (DD-MM-YYYY)	2. REPORT TYPE	3. DATES COVERED (From - To)
------------------------------------	-----------------------	-------------------------------------

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)	8. PERFORMING ORGANIZATION REPORT NUMBER
-----------------------------------------------------------	-------------------------------------------------

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON	
a. REPORT	b. ABSTRACT	c. THIS PAGE			19b. TELEPHONE NUMBER (Include area code)	

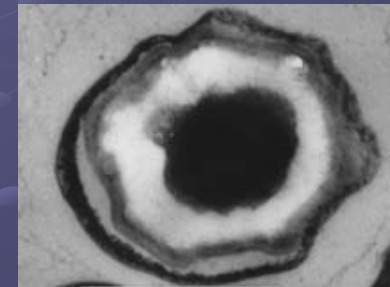


Chem-Bio Self-Decontaminating Surfaces



AFRL Quarterly Summary on DARPA Effort

December 5, 2007



Brian Heimbuch
Kimberly O'Gurek
Applied Research Associates

Dr. Joe Wander
Air Force Research Laboratory

Distribution Statement: Approved for public release;
distribution unlimited.

The use of the name or mark of any specific manufacturer, commercial
product, commodity, or service in this presentation does not imply
endorsement by the Air Force.



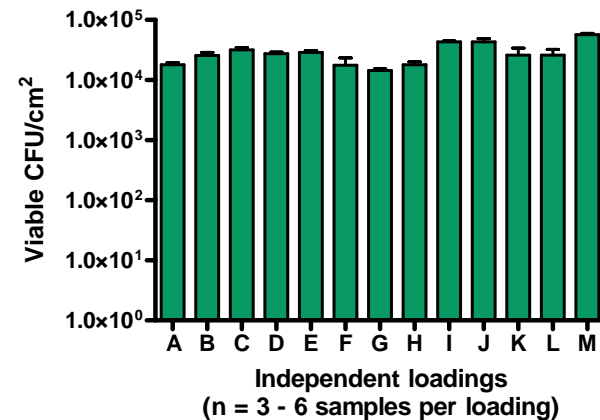
Coupon Test Method Development



Small scale aerosol test stand was optimized to deliver *Bacillus atrophaeus* spores to glass coupons



Dry aerosol *Bacillus* spore challenge of glass slides
control slides from 4-months of tests



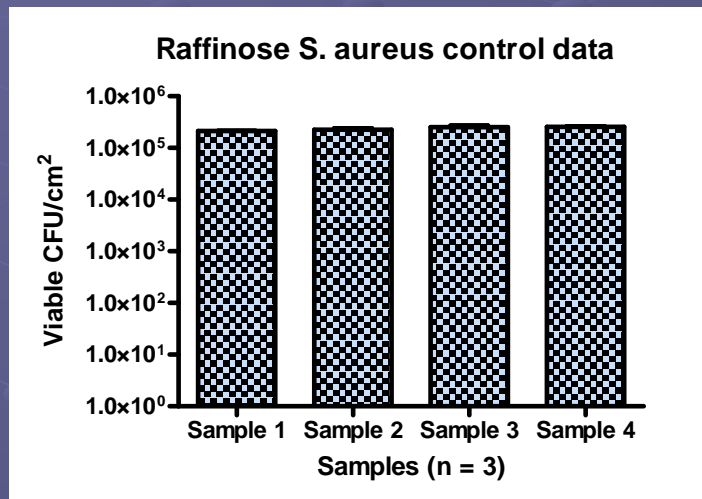
- Loading times < 5 minutes per set of samples
- All experiments exceeded 10⁴ CFU/cm²
- Average Coefficient of Variation (CV) = 13.6%



Coupon Test Method Development



Small scale aerosol test stand was optimized to deliver viable *Staphylococcus aureus* to glass coupons



	Initial Plating	1-hour incubation	Ratio
Average	2.70E+05	2.36E+05	87.4%

Average death that occurs over the 1-hour incubation period due to desiccation = 12.6%



- Nebulization solution - 1% raffinose
- Loading times < 5 minutes per set of samples
- All experiments exceeded 10⁴ CFU/cm²
- Average Coefficient of Variation (CV) = 7.2%



“Large Item” Test Method Development

AFRL Biological Aerosol Test System (BATS) used to deliver spores

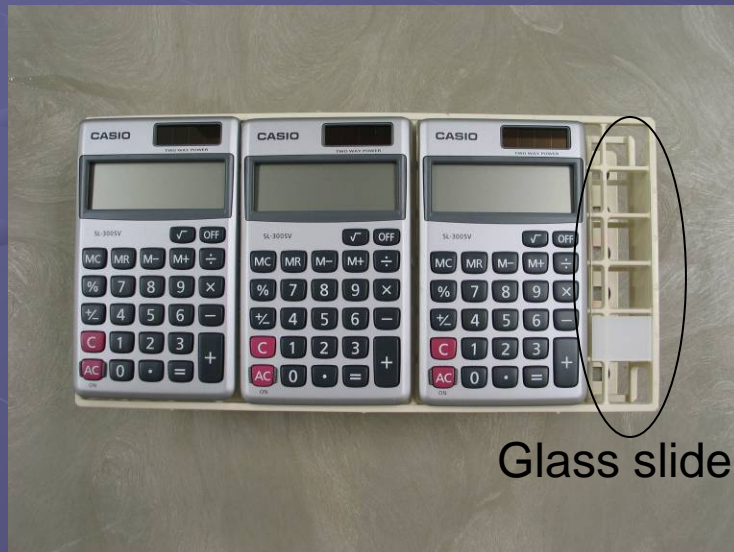


- 6-jet Collison nebulizers generate the biological aerosol
- BATS has a temperature and humidity controlled plenum chamber
- “Large items” are placed on the floor of the plenum chamber and spores are allowed to settle onto the items



“Large Item” Test Method Development

- Calculators were used as “mock” items to mimic the actual test articles
- Glass slides were used to determine extraction efficiency
- *Bacillus atrophaeus* spores were aerosolized into the BATS for 30 minutes then allowed to settle overnight



Sample set up



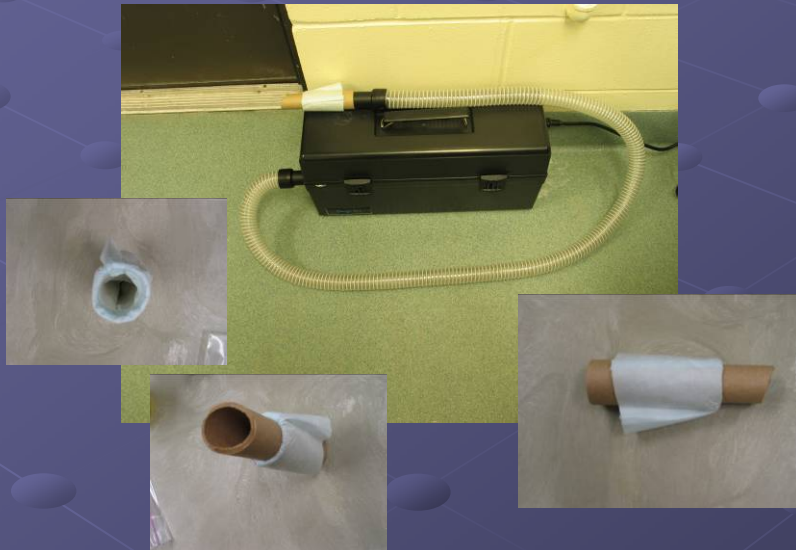
View inside of BATS



“Large Item” Test Method Development



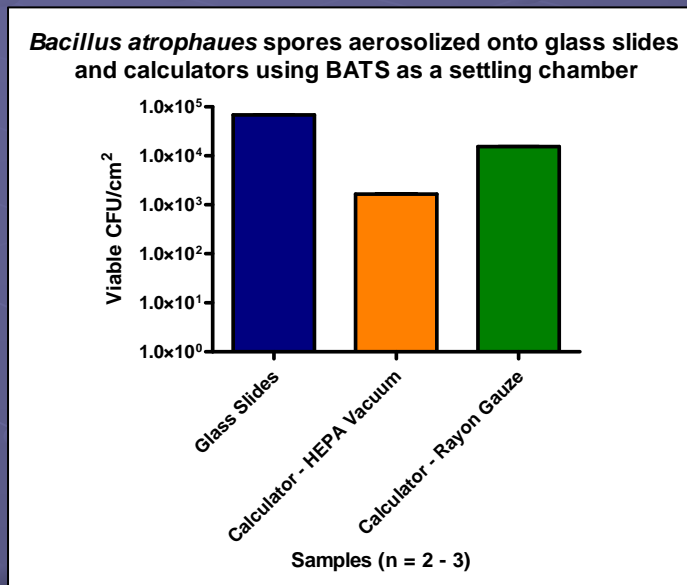
- Glass slides were sampled by suspending in 50 mL of 0.3% Tween-20
- Calculators were extracted by:
 - 1) HEPA vacuum
 - 2) Rayon gauze wipes (wetted with 0.3% Tween-20)





“Large Item” Test Method Development

Preliminary Results (only one test)



Samples	CFU/cm ²	% Recovery	CV*
Glass slides	6.85E+04	----	0.5%
Calculator (HEPA Vacuum)	1.66E+03	2.42%	3.2%
Calculator (Rayon Gauze)	1.54E+04	22.52%	2.7%

*Coefficient of Variation

- Loading goal of 10⁴ CFU/cm² was achieved
 - Coefficient of variations were very low
 - Rayon gauze outperformed HEPA vacuum
-
- Work will continue to optimize sampling efficiency
 - Sampling protocol will be changed for HEPA vacuum to increase sampling