

## METSS Corporation

Materials Engineering & Technical Support Services (METSS) Corporation, established 1996, is a cutting-edge research and applied engineering company that develops innovative solutions to challenging scientific problems. Clients include a range of public-sector agencies and industry partners. Our core strengths include expertise in chemical and biological defense (CBD), the development of advanced chemistry and materials, the development of environmentally sound products and processes, and the evaluation of materials performance in aggressive environments. Over the past 2 decades, METSS has provided substantial advisory and technical support to the Air Force with respect to CBD efforts focusing primarily on aircraft decontaminability and survivability.

### METSS Corporation

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## METSS Microbiology

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## Microbiology Capabilities

METSS has established a 500 ft<sup>2</sup> Biosafety Level-2 (BL-2) laboratory (Figure 1) to support both government and private research. The lab is led by our Senior Microbiologist with more than 30 years of R&D experience in fields of environmental, medical, and industrial microbiology. The laboratory is used for research, development, testing, and evaluation of novel, non-destructive surface and air disinfection, decontamination, or sanitization technologies. Testing is performed following the guidance of applicable methodologies from agencies such as the EPA and ASTM. METSS also has 1170 ft<sup>3</sup> temperature and relative humidity controlled room-scale test chamber used for non-bioaerosol pathogen testing or bioaerosol testing with surrogate organisms. The room-scale test chamber can be modified as deemed appropriate to meet specific project needs.

METSS microbiology experience includes:

- bacterial organisms such as *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Klebsiella pneumonia*, *Listeria monocytogenes*, and *Salmonella enterica*;
- fungi including *Penicillium sp.*, *Aspergillus sp.*, *Byssoschlamys sp.*, and *Candida albicans*;
- spore surrogates of *Bacillus anthracis* including *B. thuringiensis* and *B. atropheus*; and
- surrogates of enveloped and non-enveloped viruses including Phi6 and MS2 bacteriophage, respectively.
- pre-inoculated coupons or swab collection for quantitative field sampling



Figure 1. METSS's BSL-2 laboratory



## Bioaerosol Capabilities

METSS has the capability to conduct large-scale bioaerosol studies for development or testing of novel air/surface decontamination technologies. A retrofitted 20-foot ISO container is used as a room-scale test system as shown in Figure 2. Bioaerosol work has been successfully performed in this environment with virus surrogate MS2 bacteriophage, and testing can be performed with other BSL-1 bacterial cells and spores. Efficacy testing on fomite materials (porous and non-porous) can also be performed against BSL-2 organisms. METSS utilizes a 6-jet Collision nebulizer to generate bioaerosols and SKC biosamplers and AGI-30 samplers for sample collection. Standard microbiology spread plating, membrane filtration, and top agar overlay methods are employed to measure infective/culturable organism from control and treated test samples. The test system is designed to conduct time-to-kill efficacy tests using a sampling rail and sampling hatch which allows bioaerosol and/or fomite samples to be analyzed intermittently during a given test.

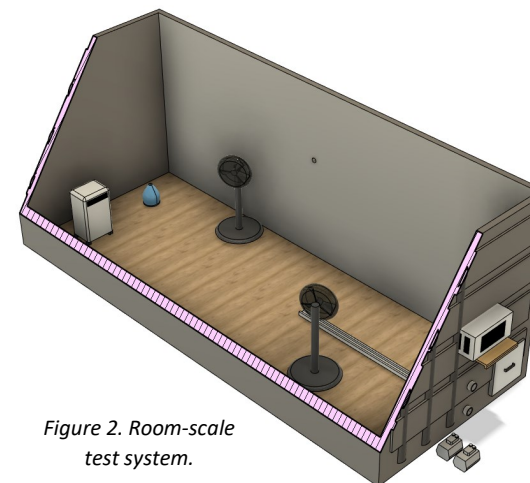


Figure 2. Room-scale test system.

## Cost Advantage

As a small business, METSS services are very cost competitive and ideally suited to perform non-biased 3rd-party testing and evaluation studies for agencies interested in assessing the efficacy of novel or commercially available air and/or surface decontamination technologies. METSS has the capability to assess such technologies against surrogate viruses and bacterial pathogens by generating quality, non-biased data to allow interested parties to make an informed decision on whether to further invest in the technology (either in its development or acquisition). Bioaerosol testing of room air disinfection technologies against a virus can cost approximately \$75,000 (one set of triplicate tests: excluding method development and verification). METSS can perform comparable room-scale bioaerosol and fomite efficacy tests using surrogate viruses at a fraction of the cost (\$5,000-\$10,000).



Figure 3. JSF Live Fire Test for Chem-Bio Survivability (approved for public release - JSF17-1142)

## Field Testing Capabilities

METSS has extensive experience performing chemical and biological dissemination & persistence studies for the Department of Defense (Figure 3). Surrogate agents have been dispensed under controlled conditions using aerosols or direct liquid inoculation methods. Standard air/surface sampling analysis methods are used to recover the target surrogates. Biological surrogates have included spores of *Bacillus thuringiensis* and *Bacillus anthracis*, and MS2 and Phi6 bacteriophage.

## Selected DTIC Publications

USAF Contract No. FA8650-21-C-6282. **Hot Air Decontamination (HAD) of a C-17 Using Diesel-Powered Heaters at Dover Air Force Base.** A. Theys, D. Lorch, M. Docter, D. Lewis, W. Greer, M. Horenziak. AD1145937. AFRL-RH-WP-TR-2021-0038. July 2021.

USAF Contract No. FA8650-19-D-6990, 0001. **Biothermal Decontamination of Biological Spores on Nylon.** D. Lorch, A. Theys., W. Greer. AD1091791. AFRL-RH-WP-SR-2019-0006. Nov. 2019.

USAF Contract No. FA8650-13-D-6405, 0006. **Joint Strike Fighter Aircraft Chemical and Biological Survivability System Level Qualification, Live Fire Test & Evaluation Report.** W. Greer, A. Theys, G. Nemes, D. Lorch. AD1069975. AFRL-RH-WP-TR-2018-0078, 2018.

US Air Force Contract Number FA8650-13-D-6405, 0002. **Joint Biological Decontamination System (JBADS) Joint Capabilities Technologies Demonstration (JCTD) Technical Studies and Evaluations.** A. Theys, W. Davis, K. Heater. AD1039790. AFRL-RH-WP-TR-2017-0052. June 2017.