

# Evaluation of Commercially-available Equipment for the Decontamination of *Bacillus anthracis* Spores in an Urban Subway System

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## ABSTRACT

The Underground Transport Restoration (UTR) project was an inter-agency effort aimed to improve the capability for transit systems to rapidly and safely recover from a wide area biological contamination incident by refining existing methods, tools, and protocols for characterization, clean-up, and clearance of contamination in physical structures. The U.S. EPA, in partnership with Battelle, investigated the potential use and durability of commercially-available equipment and associated efficacy for the use in dispensing liquid chemicals at a large scale to decontaminate subway surfaces following a biological contamination incident.

## TEST OBJECTIVES

Survey of commercially available equipment was conducted resulting in identification of three pieces of priority spray equipment [MM Sprayers, Air-O-Fan® (AOF), and Dust Boss®].

Durability assessment conducted by subjecting selected equipment to 100 hours of operation with pH-amended bleach (pAB) using smaller proxy equipment to test for material compatibility

Field scale demonstration conducted using two pieces of equipment (AOF and Dust Boss sprayers) at a subway platform/tunnel at Fort A.P. Hill (FAPH, Bowling Green, VA).

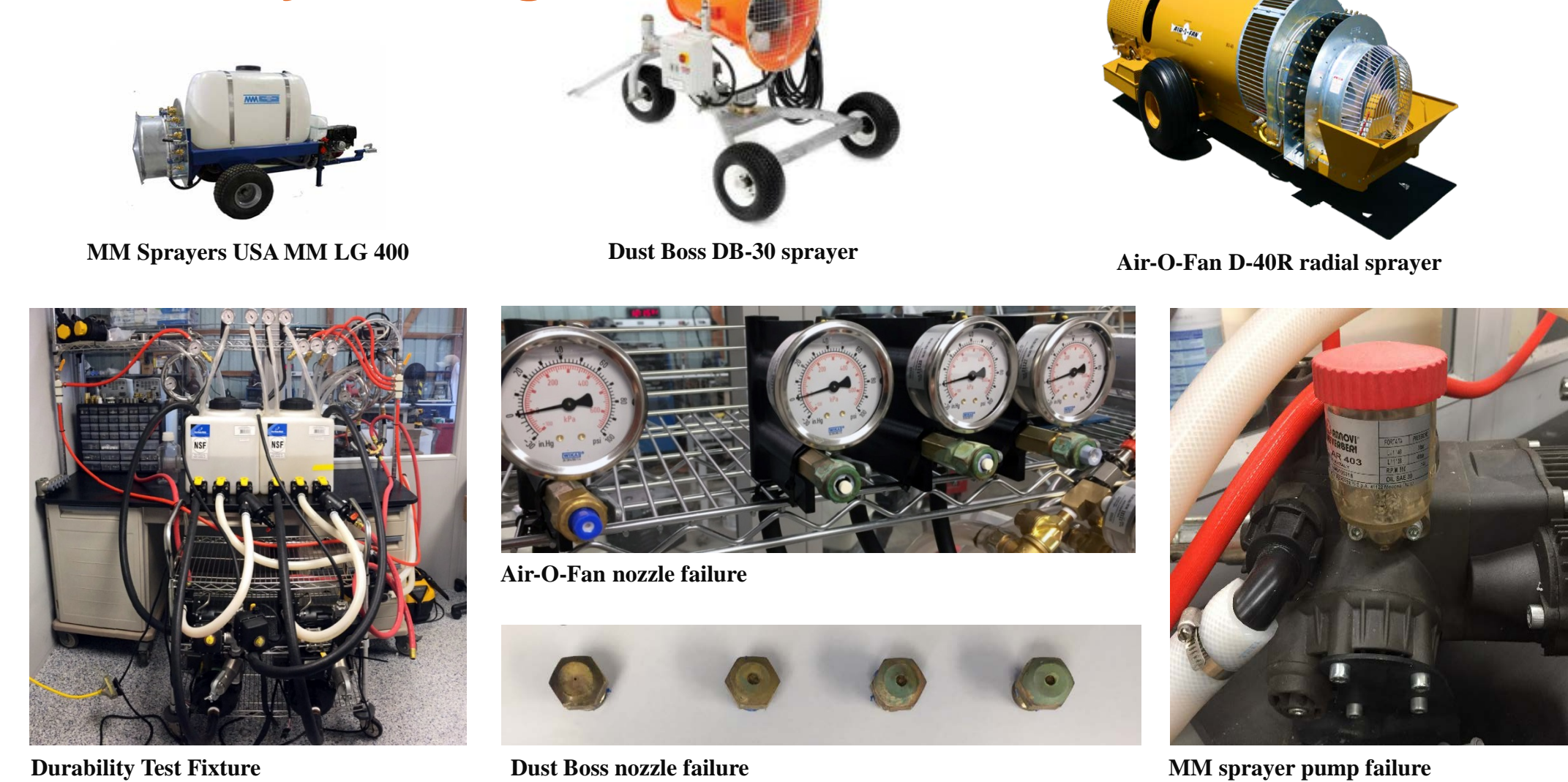
Decontamination efficacy testing was conducted with operationally sprayed pAB against surrogate *B.g.* was evaluated at target delivery speeds of 1.2 and 2.4 mph on vertical and horizontal coupon orientations, and contact times ranging from 30 minutes (min) to 12 hours (overnight) for a total of 4 tests.

### Disclaimer

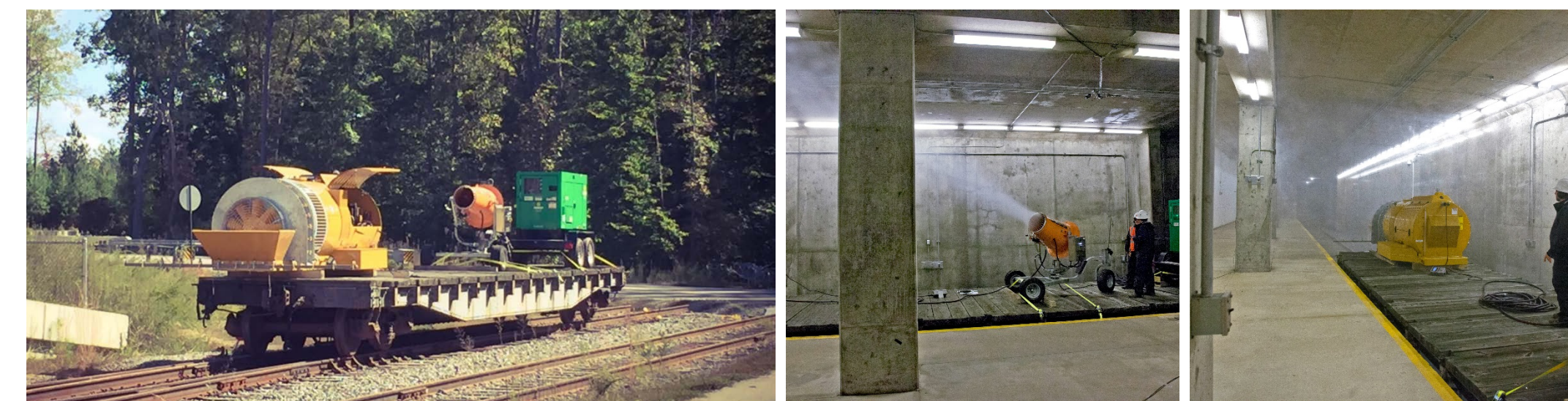
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## TECHNICAL APPROACH

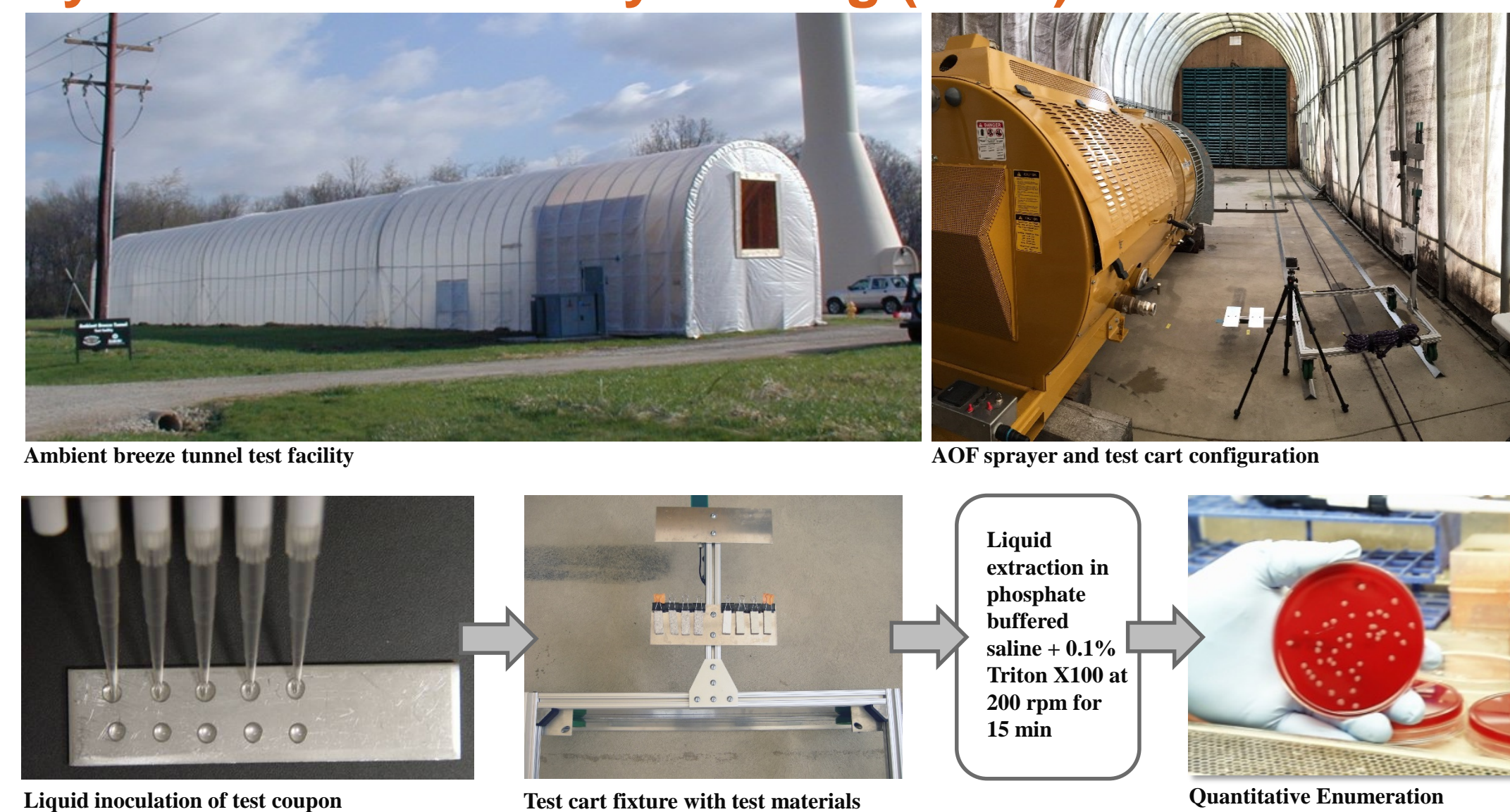
### Durability Testing



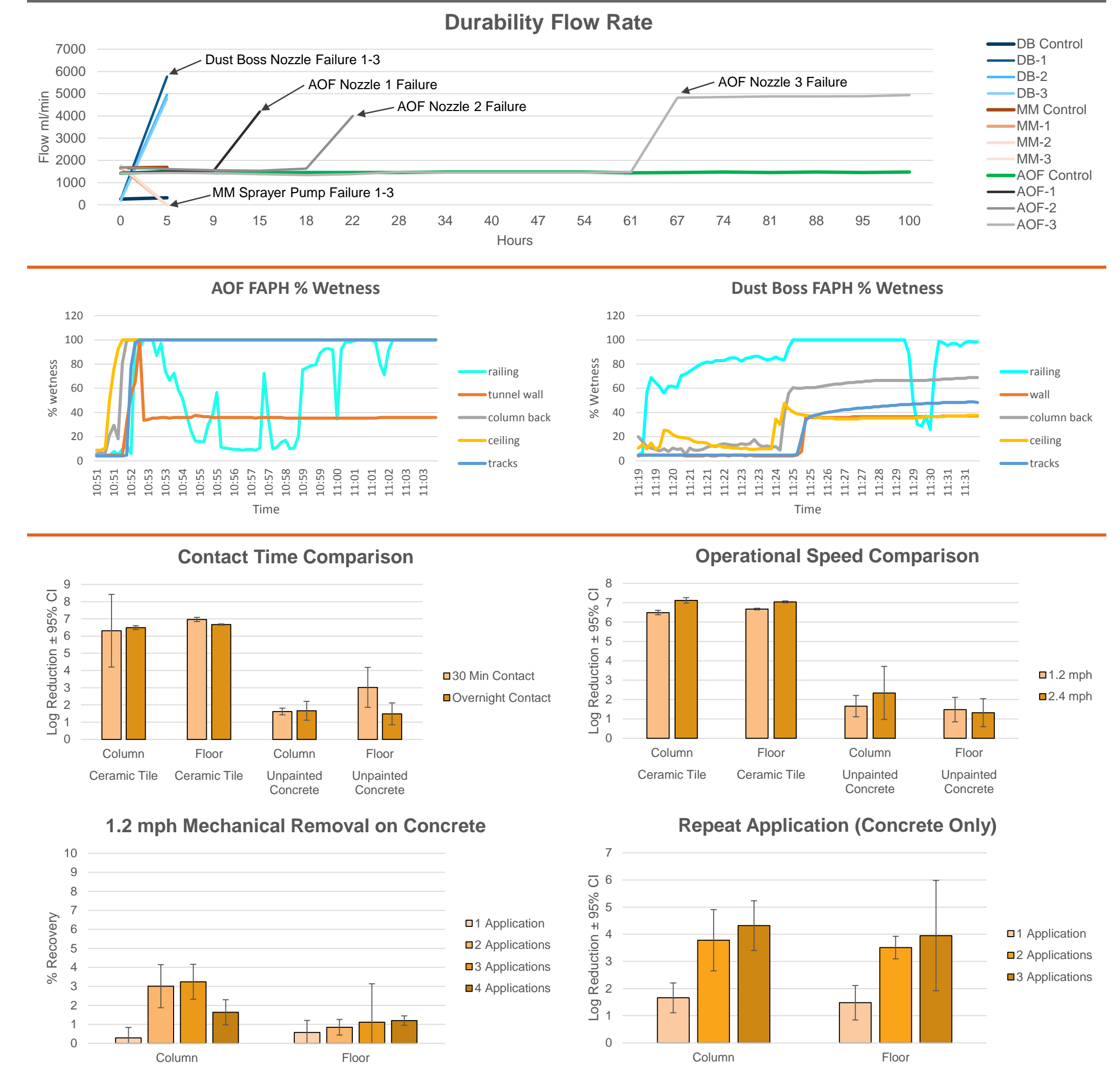
### Fort A.P. Hill Field Scale Demonstration



### System Scale Efficacy Testing (10°C)



## RESULTS



## KEY FINDINGS

- Dust Boss and AOF tests identified replacement nozzles that may result in increased durability.
- Demonstration resulted in 100% coverage at all locations for AOF.
- All efficacy testing conducted with ceramic tile resulted in >6 LR, while no conditions resulted in >6 LR of *B.g.* on unpainted concrete.
- Using AOF and application speed of 2.4 mph, 30 min contact time, 151 liters per minute (~40 gal/min) liquid delivery rate, and 3 repeat applications, each mile of subway tunnel could be decontaminated in 2 hours and 45 min using 11,325 L (~3000 gal) of decontaminant.
- Based on findings this would result in >6 LR for ceramic tile and ~ 4 LR for unpainted concrete.

