CONCURRENT SESSION 6 – BIOLOGICAL AGENT DECONTAMINATION

Environmental Influences on the Resuspension of *Bacillus thuringiensis kurstaki* Spores

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Controlled resuspension experiments were performed to understand how the rate of *Bacillus* spore resuspension changes over time and under the influence of variable meteorological conditions following an urban release of a persistent biological agent like *Bacillus anthracis*. Two coupon types (concrete and asphalt, 66 of each type) representing surfaces typically found in an urban setting were pre-loaded with 107 colony forming units per square centimeter (CFU/cm2) of *Bacillus thuringiensis kurstaki* (BtK) spores. Coupons were stored in either an environmentally controlled chamber or an outdoor chamber under ambient environmental conditions. Coupons stored inside the environmental chamber were designated as control coupons or "misted" coupons. The "misted" coupons were wetted with a fine water mist to simulate light rain. Coupons in the outdoor chamber were subjected to naturally fluctuating meteorology, but were protected against wind, rain, and other precipitation. Spore resuspension fractions were determined at four timepoints (0, 4, 10, and 18 weeks).

Within an aerosol wind tunnel using aggressive air sampling, resuspension fractions were determined at two forces (0.86 lbf and 1.2 lbf) applied by a leaf blower from triplicate control, misted, or outdoor coupons at each time point. The coupons that previously underwent resuspension tests were tested again at 4-, 10-, and 18-weeks post-inoculation, such that any one coupon underwent a maximum of four resuspension tests. Resuspended spores were collected on polyester fiber felt filters, extracted, plated, and enumerated. An analysis of variance identified coupon type, exposure condition, and number of resuspension events as statistically significant variables that affect spore resuspension. The initial resuspension fraction for each coupon material and exposure condition did not vary between the four timepoints. The resuspension fraction from the control and misted concrete varied with coupon material. For the control coupons, mean resuspension fraction values for concrete were ~5X10-3 versus ~1X10-4 for asphalt. For misted coupons, concrete coupon mean values were ~5X10-4 compared to ~7X10-5 for asphalt coupons. Concrete and asphalt coupons exposed to environmental conditions had similar resuspension fractions of ~5X10-7 and were similar and constant over time. The control and misted coupons of both material types exhibited an exponential decay in resuspension fraction. In general, the asphalt control and misted coupons had 10 times less resuspension than the concrete and control coupons, respectively. It is likely that the resuspension fraction reduction over time was due to a decrease in spores on the coupon surface that were "available" for resuspension. The results from these experiments provided quantitative data measuring the impact of the various factors on *Bacillus* spore resuspension fraction and can be used to inform sampling and remediation efforts following an outdoor urban biological release.