

POSTER SESSION

1 A Film-forming, Biocidal Strippable Coating for Subway Car Biocontaminant Mitigation

Kevin Beltis | *TIAX LLC*

Railway/Subway cars present a particularly unusual scenario for bio-decontamination due to their complexity of construction and, given their function for mass transport, for the unpredictable potential to affect nearby resources. TIAX has developed a liquid spray-applied coating that forms a strippable film to encapsulate both liquid and particulate hazards. Upon curing the film is readily removed for disposal. For a US EPA-Office of Homeland Security project, we focused on an adaptation incorporating a quaternary ammonium compound (Quat) as an active biocide to address the scenario of a powdered biological threat settling onto subway car interior surfaces.

This spray-on system can mitigate contaminant exposure by immediate encapsulation, preventing cross-contamination and minimizing the quantity of hazardous waste generated. Incorporating a Quat into the coating provides permanent encapsulation with excellent biocidal activity. The removal technique provides for rolling the contaminant inward as it is stripped from the surface. This results in the contaminant being sequestered within the solid, rolled material, ready for disposal without special handling.

The subject study used replicate evaluation of 1-mg quantities of benign, powdered bacilli onto 25-cm² area test coupons from subway cars corresponding to 8x10⁷ CFU/m² inoculant. *Bacillus thuringiensis* and *Bacillus atrophaeus* were used as surrogate inoculants against several non-porous surfaces found in subway cars. The technique demonstrated the following benefits:

- 97% removal efficacy with 2+ log kill of powdered, aerosol-deposited bacilli
 - No secondary containment required ahead of treatment (i.e., no enclosure of contaminated equipment)
 - Minimum manpower: one or two technicians for coating application and subsequent removal
 - Minimal outside logistical support (no special tools, electrical, external water supply, etc.)
 - Reduced risk to the hazmat responders, public and environment by immediate encapsulation of the hazard
 - No water washdown, no ground containment devices (e.g., booms - especially difficult for railcars)
 - Encapsulation allows time for subsequent, more complete action planning (e.g., either complete treatment in place or move the hazard to a better location for further remediation)
 - Application uses inexpensive, commercially available, battery-operated, hand-held paint sprayer
 - Treatment materials are non-toxic, and environmentally safe
 - Highly compatible with all non-porous materials of construction
 - Minimal solid waste generated for a 60-ft subway car is approximately 15-25 kg, no liquid waste
 - Produced a one-year shelf-stable formulation with 2-log biohazard reduction (removal + kill)
 - Formulations capable of 5-log biohazard reduction possible, but result in shorter shelf life.
-