CONCURRENT SESSION 7 – HAZARD RESPONSE

Stabilization/Containment of RDD/IND Particle Contamination to Enhance First Responder, Early Phase Worker, and Public Safety

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In the event of large-scale radioactive contamination, whether from accidental dissemination or intentional dispersion from a radiological dispersive device (RDD) or improvised nuclear detonation (IND), remediation will follow. It is desirable to minimize resuspension and tracking of radioactive particles during remediation to protect against further harm to the public, environment, and to protect the health of workers performing remediation. The objective of this study was to assess commercially available stabilization technologies used in other industries, such as construction, for their ability to prevent resuspension and tracking of radioactive particles from common outdoor surfaces.

Test surfaces included concrete pavers, asphalt pavers, and soil. Simulated fallout material (SFM) was generated by spraying an aqueous solution of strontium chloride (Sr-85) onto a mix of equal parts ultrafine test dust and coarse test dust, mixing well, and allowing the mixture to dry. Following application of SFM to test surfaces, stabilization to minimize resuspension and tracking of SFM was achieved by applying either aqueous calcium chloride (CaCl2), Phos-Chek® MVP-Fx flame retardant, or Soil2OTM dust control. Gamma emission was measured before and after tracking of SFM with a sodium iodide (NaI) spectrometer. Tracking of SFM was achieved by walking and rolling of a weighted simulated vehicle across contaminated test surfaces. Surfaces measured after tracking include the contaminated test surface, boot bottoms or tires, and previously uncontaminated surfaces to which SFM was tracked. During walking experiments, resuspended SFM was collected onto 47 mm glass fiber filters via a high-volume air sampler. Percent removal (%R), percent transferred (%T), and percent residual (%Res) of radiological activity were calculated for trials of stabilized surfaces and compared to those of non-stabilized control (NSC) trials to evaluate effectiveness of tested technologies to minimize tracking of SFM.

All tested technologies reduced, or eliminated, resuspension of SFM when walking through soil. For simulated vehicle tracking with a weighted simulated vehicle, CaCl2 and MVP-Fx, in most cases, did offer lower average %R and %T when compared to NSC. In some instances, no improvement was demonstrated by tested stabilization technology. For walking experiments, performance is similar to simulated vehicle tracking with some technologies, such as CaCl2 resulting in improved average %R and %T on concrete. MVP-FX resulted in improved average %R and %T on asphalt, while some combinations of surface and stabilization technology offered no improvement when compared to NSC.