## Logistics Modeling of a Wide Area Decontamination Operation Using Wash Down Techniques

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In the event of wide-spread nuclear contamination, there is a need for established recovery plans using quick, non-destructive decontamination techniques. Such techniques help minimize the detrimental economic, social, and psychological effects of wide-spread contamination. Much of the current literature focuses on the early response but provides little guidance on the details of late-phase recovery.

To address the need for adaptable and rapid decontamination/remediation techniques following a large-scale nuclear contamination incident, particularly in the urban environment, the Integrated Wash Aid Treatment Emergency Reuse System (IWATERS, Fig. 1) has been described. There are three primary steps in IWATERS: 1) an ionic wash solution, termed "wash-aid", is applied to a surface via hosing, pressure washing, or another mechanism; 2) the contaminated wash solution is collected and fed into ad hoc filtration beds with readily-available infill material; and 3) the treated wash solution is recycled throughout decontamination operations, thereby preserving the water resource. Work characterizing the system was comprised of lab-scale experimentation, filtration bed simulations, and several field demonstrations.

We employed Analysis of Mobility Platform (AMP) and GoldSim software to model the logistics of deploying materials to implement the Integrated Wash Aid Treatment Emergency Reuse System (IWATERS) in a hypothetical cesium-contamination scenario covering a four-block strip of downtown Chicago, IL. In this deployment of IWATERS, buildings were washed down via fire-hosing and contaminated wash solution was collected in the city's waste/storm water collection system. The contaminated wash water was treated to remove cesium via ad hoc sand/clay filtration beds, and the treated wash solution was recycled during continuing decontamination operations. A detailed task timeline for the IWATERS deployment and information (or assumptions) on the availability and location of required resources for operations provided input parameters, as well as a framework, to enable the AMP and GoldSim simulations. From the decision to deploy IWATERS to the end of operations, including the completion of processing all contaminated wash water, took 49 days with decontamination teams active for 35 days and treatment bed teams active for 37 days. The modeling results showed the availability of vermiculite clay (based on data supplied by its commercial vendors/distributors) as the limiting factor for deploying treatment bed teams and, consequentially, the recycling rate of wash water and the timeline for decontamination operations. These simulations represent the first attempt at understanding the material and personnel requirements for large-scale IWATERS operation.