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Savannah River Laboratory Decontamination Technology Program (U)

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SAVANNAH RIVER SITE

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Overview

Savannah River Laboratory (SRL) has had a Decontamination and Decommissioning (D&D) Technology program¹ since 1981. The objective of this program is to provide state-of-the-art technology for use in D&D operations that will enable our customers to minimize waste generated and personal exposure, increase productivity and safety, and to minimize the potential for release and uptake of radioactive material. The program identifies and evaluates existing technology, develops new technology, and provides technical assistance to implement its use onsite.

This program has impacted not only the Savannah River Site (SRS), but the entire Department of Energy (DOE) complex. To document and communicate the technology generated by this program, 28 papers have been presented at National and International meetings in the United States and Foreign Countries.

Discussion

Some of the D&D technology evaluated and some of the technical assistance provided to the SRS is summarized below.

Evaluation of Decontamination Solutions²

Environmentally safe, effective decontamination solutions have been evaluated and recommended site-wide. A nitric-oxalic acid solution for decontamination of lead was identified and found to be effective in 1989. Plans are to investigate nitric-oxalic acid solutions for decontamination of Type 304L stainless steel as discussed in S.K. Zonar's WINC memorandum SKZ-13-91.³

Defense Waste Processing Facility Canister Decontamination⁴

The abrasive blasting process for decontaminating Defense Waste Processing Facility (DWPF) waste glass canisters is a product of the SRL D&D Technology Program. Using this process rather than a chemical decontamination process resulted in a savings of \$79 million (1979 dollars) in the cost of the DWPF. In addition, there is a large waste reduction. The canisters are decontaminated with the generation of no additional waste since the glass frit used as the abrasive is used to produce the waste glass.

Decontamination of the Savannah River Plant H-Area Hot-Canyon Crane⁵

Decontamination techniques applicable to the remotely operated bridge crane in canyon buildings at the SRS were evaluated in laboratory-scale tests. High pressure Freon was found to be the most attractive process available. Decontamination of the crane using this technology was accomplished with 85% less personnel exposure than estimated by the Health Protection Department.

Robotic Decontamination at the Savannah River Plant⁶

Robotic decontamination techniques were developed and used in two applications at the Savannah River Plant (SRP). Equipment was first used in a nonradioactive mockup to demonstrate techniques and to train personnel prior to radioactive work. Using this technology the 221-F Hot Gang Valve Corridor and the top of Tank 13 were decontaminated to goal levels with minimal exposure to radiation.

Decontamination and Coating of Lead⁷

Mechanical and chemical decontamination processes were investigated for decontaminating lead. A nitric-oxalic acid solution was identified that is used by the French for this purpose. Coating technology was also investigated for preventing lead from becoming contaminated. A suitable coating was identified, a large scale demonstration was conducted, and field testing of coated lead bricks is in progress.

Polyester Wiping Cloths⁸

Polyester cloth treated by textile chemistry processes to increase its sorbency was evaluated as an alternative to "Atomic wipes" for use in decontamination by wiping. Some of the advantages of the polyester wiping cloths are waste reduction, compatibility with nitric acid, more fire resistant, can be laundered for reuse, and mechanically stronger so there is less linting. These cloths have been stocked in Stores.

CO₂ Blasting

CO₂ blasting uses solid carbon dioxide pellets to remove contamination. No additional waste is generated and the surface finish is not degraded. A unit is being tested and modified.

Shredding and Compacting

Shredding of plastic suits can result in a 50% volume reduction. Compaction can result in an 80% volume reduction. Equipment is being investigated.

Foam Decontamination Technology

When decontamination solutions are applied as a foam, the dwell time of the solution is increased, enhancing its effectiveness. Decontamination solution waste is reduced by up to 70%. Equipment is being demonstrated and foam solutions are being investigated.

Kelly Machines

The Kelly machine combines superheated water with a vacuum system to decontaminate surfaces. SRL evaluated this tool, trained site personnel on its use, and provides technical support for the six machines at the SRS.

Prepolishing

Stainless steel surfaces that are electropolished before exposure to radioactive contamination become less contaminated and are easier to decontaminate. Through discussion with customers, SRL has implemented the use of this technology in some areas.

Electrochemical Decontamination

Technology was identified to decontaminate stainless steel to releasable limits by electropolishing in a nitric acid bath. The wastes from this operation are compatible with the existing waste streams. Plans are to obtain this technology.

Concrete Surfacing Equipment

Equipment has been identified which could greatly increase the rate of cleaning contaminated concrete surfaces. Plans are to purchase a unit for demonstration.

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