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Innovative Approach to Reduction of Waste Streams for Cutting Operations in Remote Environments

Objective

SRNL proposes to develop and demonstrate an approach using the SRNL rotary microfilter (RMF) technology for reducing waste streams in remote cutting operations during decontamination operations. SRNL offers to collaborate with Tokyo Electric Power Company (TEPCO) in evaluation, testing, and utilization of SRNL's radiation-hardened rotary microfilter in the deactivation and decommissioning (D&D) operations of the Fukushima Daiichi Nuclear Power Station (NPS). Refinement of the scope and associated costs will be conducted in consultation with TEPCO.

Problem

D&D operations on the compromised primary containment vessel and fuel assemblies at the Fukushima Daiichi NPS are currently in an exploratory phase. Work is underway to design and implement a system that will be most conducive to remote operation in a high contamination environment. Without regard to the cutting method employed, significant fuel assembly and PVC swarf as well as considerable quantities of cutting-operation cooling liquids will be generated, which will subsequently become part of the waste stream. Crossflow filtration systems as would typically be employed require large pumps and infrastructure, while filtration efficiencies represent a limiting factor to continuous cutting operations.

Technology:

SRNL has modified a 25-disc rotary microfiltration system¹ to be radiation hardened and optimized for remote operations in high-radiation contaminated areas. The objective of the proposed work is to demonstrate the applicability and efficiency in removing simulated swarf materials as specified by TEPCO from a simulated coolant waste stream and in the reduction of coolant waste stream discharged into downstream aqueous waste handling systems at Fukushima Daiichi NPS.

The SRNL-modified rotary microfilter technology has been used at SRNL to rapidly filter out particulate fissile material, and have demonstrated operations utilizing much lower energy inputs, require much less space to operate than traditional crossflow filtration systems, and are optimized for operation and repair in remote, highly contaminated areas.

SRNL's radiation-hardened rotary microfilter (RMF) is highly adaptable for remote, non-permissive environment operations, is site-scalable to onsite operations, and can significantly reduce waste stream outputs as compared to any filtration system currently available in the marketplace.

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SRNL Rotary Microfilter System

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