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## **Repair and Mitigation of Chloride-Induced Pitting and Chloride-Induced Stress Corrosion Cracking in Used Nuclear Fuel Dry Cask Canister Materials**

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**ABSTRACT:**

Material degradation and aging management of dry cask storage system canisters has become a topic of concern within the commercial nuclear power community in the United States. Among them, chloride-induced pitting (CIP) and chloride-induced stress corrosion cracking (CISCC) are two big issues. Promising repair and mitigation processes are in high demand. In this proposed project, the suitability of various repair and mitigation processes to combat against CIP and CISCC in 304 stainless steel will be evaluated and the most effective processes will be provided. The current state of knowledge surrounding controlled temperature friction stir welding (FSW) and cold spray deposition as repair and mitigation technologies will be expanded. In addition, this project will introduce technologies that have not yet been evaluated for UNF applications, including vaporizing foil actuator welding (VFAW), and soldering. These processes will be performed on simulated cracked test specimens and evaluated in terms of the thermal history and peak temperature on the simulated canister surface during repair, resulting deformation of the canister, area of coverage that may be achieved using the technique, repair depth limitations, and their ability to mitigate against CIP and CISCC after repair based on accelerated laboratory CISCC screening tests. Finally, two most promising processes will be down selected. Corresponding repaired specimens will be subjected to a comprehensive corrosion and stress corrosion cracking studies and their behavior and properties will be compared with the base material.