



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

Grant # 31310020M0003

Grantee: University of Southern California

Title of Grant: Risk-informed Condition Assessment of Spent Nuclear Fuel Canisters Using Experimental Measurements and High-fidelity Computational Models

Period of Performance: 9/25/2020-9/24/2023 (FY20 Notice of Funding Opportunity NOFO)

Executive Summary

The overarching goal of this proposed project is to advance the knowledge base and provide a probabilistically informed decision-support tool for integrity assessment of spent nuclear fuel (SNF) packages that are pending transportation and long-term storage. The project will leverage the existing experimental and computational methods being developed by the PIs and the developed methodology will be applicable to most variants of SNF packages in the United States. The proposed research will advance the current analysis methods for risk-informed decision making and provide new knowledge regarding characterization, handling, transportation and storage of SNF packages. Dynamic characteristics of a physical mock-up SNF package will be measured with emphasis on characterization of experimental measurement uncertainty and design of experiments for optimal data collection and damage detection. Simultaneously, high-fidelity computational models will be validated and incorporated in a probabilistic assessment framework to solve an inverse problem in the presence of experimental data and identify different failure modes relevant to SNF packages. This project will not only provide a risk assessment tool but also quantified risk metrics as a function of identified damage (if any) or vulnerabilities, the associated hazard and the exposure conditions. It will address a critical research gap towards longevity of nuclear power in the United States.

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Presentations and Publications

The list of publications was submitted with the final report after grant expiration.

- Online article: Managing the storage and transportation of commercial spent nuclear fuel – Innovation News Network
<https://www.innovationnewsnetwork.com/managing-storage-transportation-commercial-spent-nuclear-fuel/23340/>
 - Online article: Frequency Response Function Based Damage Detection of Spent Nuclear Fuel Canisters – American Nuclear Society
<https://www.ans.org/pubs/proceedings/article-52771/> (Subscription needed to ANS)
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Patents

N/A