

**Development and Characterization of a  
New Thermal Neutron Absorbing Ni-Cr-Mo-Gd  
Structural Alloy  
for Controlling Nuclear Criticality in Yucca  
Mountain Waste Canisters**

by

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**Abstract**

The long-term permanent storage of spent nuclear fuel (SNF) at Yucca Mountain is a contentious issue. Much of the opposition to the construction and end use of such a storage facility is fueled by the perception that there will be certain human and environmental risks associated with the site. Certainly much of this opposition is well-founded. It is a fact that this repository site will contain toxic radioactive waste for some finite indeterminate period. The U.S. Department of Energy (DOE) is responsible for insuring the safety of both the environment and the general public during this period. One of the riskiest storage problems involves the permanent deposition of high-level waste (HLW) and nuclear fuels containing highly-enriched uranium (HEU). If the walls of a canister housing this fuel were to become completely breached, a low-probability event, and fluid infiltrated HEU contents, there is some probability that it could lead to a critical event. Our group at the Idaho National Laboratory (INL), and collaborators, has developed a new alloy to provide some criticality control in the event this improbable scenario was to occur. This alloy was designed to be a neutron absorber, corrosion resistant, and possess some structural quality. This presentation will furnish data demonstrating that this alloy possesses the aforementioned character. Additionally, this talk will present data detailing some of the more fundamental science of Ni-Cr-Mo-Gd local corrosion mechanisms and summarize some new directions being pursued within our group.

