U.S. Department of Energy

IRP - Fuel Aging in Storage and Transportation (FAST): Accelerated Characterization and Performance Assessment of the Used Nuclear Fuel Storage System

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Program: IRP – Accelerated Aging of Used Nuclear Fuel in Storage

Collaborating Institutions, Investigators and Budget Information:

Boise State University:	D. Butt, M. Hurley, and S.M. Loo	~$710,000
North Carolina State University:	J. Eapen and K.L Murty	~$710,000
Texas A&M University:	S.M. McDeavitt and L. Shao	~$830,000
University of Florida:	J. Tulenko, Y. Yang, and G.E., Fuchs	~$710,000
University of Illinois at Urbana-Champaign:	B. Heuser and J. Stubbins	~$710,000
University of Wisconsin-Madison:	T. Allen, J. Blanchard, Z. Ma, and K. Sridharan	~$710,000
Pacific Northwest National Laboratory:	C. Beyer	$60,000
Savannah River National Laboratory:	T. Adams	$60,000

ABSTRACT

Nuclear energy systems continue to be a significant and growing component of the United States energy portfolio. However, open questions regarding the final disposition of used nuclear fuel (UNF) represent a continued challenge to the long-term viability of nuclear energy. Even the most uninterested members of the public understand that the key technical question that persists is, “What are we going to do about the waste?” Even more, two recent events have raised the global national awareness of the significance of and need for safe storage of used nuclear fuel: 1) the termination of proposed deep geologic repository at Yucca Mt., NV and 2) the ongoing events at the Fukushima Nuclear Power Plants following the tragic earthquake and tsunami in Japan in March 2011.

This Integrated Research Project (IRP) combines expertise from 6 universities and 2 national laboratories with 18 individual investigators and their respective research groups. The organization will function as a matrixed engineering research team focused on four distinct, yet integrated Technical Mission Areas (TMAs): TMA1: Low Temperature Creep, TMA2: Hydrogen Behavior and Delayed Hydride Cracking, TMA3: UNF Canister Corrosion, and TMA4: Novel System Monitoring. The TMAs are designed to address challenges relevant to almost every Independent Spent Fuel Storage Installation (ISFSI) system currently deployed or under development, with a special emphasis on high burnup fuel.

This is an applied engineering project with a specific application in view (i.e., UNF dry storage). On the other hand, the proposed tasks comprise a mixture of basic science and engineering methods designed to characterize and (where appropriate) accelerate the phenomena under study. The overall objective is to create predictive tools in the form of observation methods, phenomenological models, and databases that will enable the design, installation, and licensing of dry UNF storage systems that will be capable of containing UNF for up to 300 years.