

Nuclear Science and Technology Division

Data to Support Full Burnup Credit in Spent-Nuclear-Fuel Package Designs

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For submission to
The 8th International Conference on Nuclear Criticality Safety
May 28–June 1, 2007
St. Petersburg, Russia

Sponsored by
OECD Nuclear Energy Agency and
Russian Nuclear Society

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* Managed by UT-Battelle, LLC, for the U.S. Department of Energy under contract DE-AC05-00OR22725.

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The benefits of burnup credit and the technical issues associated with utilizing burnup credit in spent-nuclear-fuel (SNF) packages have been studied in the United States for almost two decades. The issuance in 2002 of the U.S. Nuclear Regulatory Commission (NRC) staff guidance for actinide-only burnup credit was a significant step toward providing a regulatory framework for using burnup credit in transport casks. However, adherence to the current regulatory guidance (e.g., limiting credit to actinides) enables only about 30% of the existing pressurized-water-reactor SNF inventory in the United States to be transported in high-density packages. Work has been done to demonstrate that the allowable inventory could potentially be increased to nearly 90% if credit for fission products were allowed. Full burnup credit is also being utilized for permanent disposal to screen out the potential for criticality in post-closure scenarios. Oak Ridge National Laboratory has worked with the U.S. Department of Energy Office of Civilian Radioactive Waste Management, the NRC, and the Electric Power Research Institute to coordinate a research program that will obtain and evaluate the experimental data necessary to support validation within the safety basis for fission product credit.

The program plan calls for existing critical experiments and assay measurement data to be obtained and assessed for technical value in developing an adequate safety evaluation that includes both actinide and fission product credit. Nuclear data are also being assessed with a focus on determining what, if any, improvements in fission-product cross section data will help support a safety basis for full burnup credit. The program is being designed to ascertain that the data necessary for using burnup credit in boiling-water reactor SNF packages will also be addressed. This paper will review the research program, identify the data acquisition priorities, and discuss the progress to date.

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