



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
WASHINGTON, D. C. 20555

June 9, 1998

Mr. L. Joseph Callan  
Executive Director for Operations  
U. S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

Dear Mr. Callan:

SUBJECT: NRC PARTICIPATION IN THE CABRI REACTOR FUELS RESEARCH PROGRAM

During the 453rd meeting of the Advisory Committee on Reactor Safeguards, June 3-5, 1998, we discussed with representatives of the NRC staff the proposed plans for the NRC reactor fuels research program. Our Subcommittee on Reactor Fuels also discussed this matter during a meeting on April 23-24, 1998. We also had the benefit of the document referenced.

The regulatory requirements for design-basis safety analyses require consideration of the ability of reactor fuel to sustain energy inputs caused by reactivity insertion events. Current regulatory guidance indicates fuel can tolerate energy inputs of 180 to 280 cal/g regardless of the level of fuel burnup. Results of the experiments performed over the last few years have revealed that the ability of fuel to sustain sudden energy inputs decreases substantially with increasing fuel burnup. Among the test facilities used to perform experiments that have provided these findings is the French CABRI reactor, which now has a sodium experimental loop.

Revised limits on tolerable energy inputs to reactor fuel by reactivity insertion are needed for high burnup. Establishing revised limits based on empirical data is difficult because the available database is small. Furthermore, some data obtained for high burnup fuels have been questioned because of nonprototypic features of the tests. Clearly, a more extensive, better database would be useful.

The Office of Nuclear Regulatory Research (RES) proposes to participate in upgrading the CABRI reactor to include a water loop for experiments. The upgraded reactor could then be used to obtain additional data on fuel response to reactivity insertion. RES has asked for our advice on the proposed participation in the CABRI upgrade.

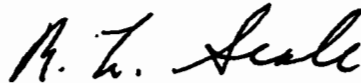
Participation in the CABRI research program is a leveraged mechanism for obtaining integral test data on the response of high burnup fuels with modern cladding to reactivity insertion events. The CABRI reactor, when equipped with a water loop, will be the world's best test facility for obtaining these data. Integral data of this type are needed to maintain an adequate technical foundation for NRC regulatory guidance on reactor fuel performance. We concur with the staff's recommendation to participate in this collaborative research program.

We recommend that the staff use quantitative methods to establish its positions on test matrices for the CABRI program. Quantitative experiment design methods should be used to determine the need for replicate tests and to determine the accuracy and precision of test data required to make substantive improvements to the existing base of knowledge.

In October 1998, we would like to discuss the status of the NRC participation in the CABRI program.

Dr. William J. Shack did not participate in the Committee's deliberation regarding this matter.

Sincerely,

A handwritten signature in cursive script, appearing to read "R. L. Seale".

R. L. Seale  
Chairman

Reference:

Memorandum dated May 22, 1998, from Thomas L. King, RES, to John T. Larkins, Executive Director, ACRS, Subject: Transmittal of Advance Copy of Agency Program Plan for High-Burnup Fuel (Predecisional)