

December 9, 2002

Dr. George E. Apostolakis, Chairman
Advisory Committee on Reactor Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: CONFIRMATORY RESEARCH PROGRAM ON HIGH-BURNUP FUEL

Dear Dr. Apostolakis:

On October 17, you wrote a letter to the NRC Chairman on the staffs confirmatory research program on high-burnup fuel, which was discussed with your committee on October 10, 2002. Your letter to the Chairman was clear and informative, and we appreciate the many positive and supportive statements that you made. Also in that letter were several observations or concerns. Our response to these subjects is provided below.

As noted in your letter, foreign tests have resulted in failure of high-burnup fuel for reactivity insertions with energy levels below the criteria in Regulatory Guide 1.77. This topic has been addressed in a number of documents including a detailed memorandum to the Commissioners on July 6, 1998. Large margins existed in safety analyses for these events, and we believed then and now that these margins are sufficient to accommodate recent test results. We expect to provide a documented analysis to quantify these margins in about a year, and appropriate modification to the regulatory guide will be pursued in the future based on results from the fuel testing program.

One concern expressed by the Committee is about the use of monotonic heatup rates for testing under loss-of-coolant-accident (LOCA) conditions. The concern is that these heatup rates might not reveal safety-significant phenomena that would be revealed only with more complicated time-temperature relations. Specifically, the Committee expressed the concern that such non-uniform heating conditions could lead to spallation of pre-existing oxide from the cladding which may be important for high-burnup fuel. The staff plans to add some tests with more complicated and realistic temperature conditions to determine if this produces additional effects on high-burnup fuel.

Another comment in your letter concerns testing single rods under LOCA conditions instead of multiple rods which could have interactions with each other. The main objective of the high burnup fuel research program is to explore the effects of burnup and cladding alloy on embrittlement and oxidation, with a secondary objective of observing any effects on ballooning deformation and rupture conditions. We expect to achieve all of these objectives with single-rod tests of high-burnup fuel. However, if there are any indications from these tests that ballooning strains are larger or that there is less axial randomness in rupture location such that multi-rod effects might be indicated, we will at that time examine the need for multi-rod tests with high-burnup fuel.

Dr. George E. Apostolakis

2

Finally, we note your comment about the risk consequences of taking fuel to high levels of burnup. As you noted, we are planning to examine these consequences in studies of high-burnup fuel in beyond-design-basis accident conditions. We will remain in contact with your staff to arrange appropriate meetings to discuss the progress of this work with the Committee.

Sincerely,

/RA by Carl J. Paperiello Acting For/

William D. Travers
Executive Director
for Operations

cc: Chairman Meserve
Commissioner Dicus
Commissioner Diaz
Commissioner McGaffigan
Commissioner Merrifield
SECY

Finally, we note your comment about the risk consequences of taking fuel to high levels of burnup. As you noted, we are planning to examine these consequences in studies of high-burnup fuel in beyond-design-basis accident conditions. We will remain in contact with your staff to arrange appropriate meetings to discuss the progress of this work with the Committee.

Sincerely,

/RA by Carl J. Paperiello Acting For/

William D. Travers
Executive Director
for Operations

cc: Chairman Meserve
Commissioner Dicus
Commissioner Diaz
Commissioner McGaffigan
Commissioner Merrifield
SECY

<u>Distribution:</u>	SMSAB R/F	DSARE R/F	DSARE Action 2002-56
	EDO G20020607	RES Action 200247	CPaperiello, DEDMRS
	WKane, DEDR	PNorry, DEDM	JCraig, AO
	SBurns/KCyr, OGC	MVirgilio, NMSS	ISchoenfeld, OEDO
	ACRS File	TClark	

C:\ORPCheckout\FileNET\ML023260357.wpd

ADAMS Package Accession No. ML023260363

*See previous concurrence

OAD in ADAMS? (Y or N) Y ADAMS ACCESSION NO.: **ML023260357** TEMPLATE NO. EDO-002
Publicly Available? (Y or N) Y DATE OF RELEASE TO PUBLIC 5 Days SENSITIVE? N

To receive a copy of this document, indicate in the box: "C" = Copy without enclosures "E" = Copy with enclosures "N" = No copy

OFFICE	SMSAB		C:SMSAB		D:DSARE		D:RES	
NAME	RMeyer:mb:mk		JRosenthal		FEltawila		AThadani	
DATE	11/08/02*		11/08/02*		11/13/02*		11/22/02*	
OFFICE	NRR		EDO					
NAME	GHolahan		WDTravers					
DATE	11/22/02*		12/09/02		/ /02		/ /02	