November 9, 2007

MEMORANDUM TO: Stacey L. Rosenberg, Chief
Special Projects Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

FROM: Tanya M. Mensah, Senior Project Manager **/RA/**
Special Projects Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

SUBJECT: SUMMARY OF THE OCTOBER 16, 2007, CATEGORY 3 PUBLIC WORKSHOP ON INTERIM REACTIVITY- INITIATED ACCIDENTS (RIA) CRITERIA

On October 17, 2007, the third public meeting was held between the U.S. Nuclear Regulatory Commission (NRC) staff and industry representatives at NRC headquarters in One White Flint North, 11555 Rockville Pike, Rockville, MD. This meeting was a follow-up to the second public meeting held on December 19, 2006. A summary of the December 19, 2006, public meeting is available in the NRC's Agencywide Documents Access and Management System (ADAMS) in Package Accession No. ML063620565. Representatives from the Westinghouse Electric Company (Westinghouse), Areva NP, Inc., GE-Hitachi Nuclear Energy (GNHE), Global Nuclear Fuel (GNF), and Electric Power Research Institute (EPRI) participated in the public meeting. A list of attendees is enclosed.

The purpose of the October 17, 2007, public meeting was to seek input and address comments from the industry representatives and members of the public on the interim criteria for RIA in NUREG-0800, "Standard Review Plan [(SRP)] for the Review of Safety Analysis Reports for Nuclear Power Plants." The following presentation slides were presented by industry representatives on the RIA interim criteria:

- EPRI Presentation Slides: Introductory Comments (ADAMS Accession No. ML072950134).
- EPRI Presentation Slides: Industry Position on the RIA Failure Limit (ADAMS Accession No. ML072950122).
- EPRI Presentation Slides: Approach To Address Core Coolability Issues With Failed Fuel (ADAMS Accession No. ML072950112).
- GE-Hitachi/GNF Presentation Slides: Probabilistic Fuel Failure Limits Versus Lower Bound Curve (ADAMS Accession No. ML072950107).
- Westinghouse Presentation Slides: NRC Workshop on RIA Coolability Issues (ML072950249).

A representative from EPRI opened the meeting by emphasizing that the objective of the workshop was to reach a consensus with the NRC staff and industry representatives on the right approach to the development of the final RIA criteria. EPRI representatives discussed how the NRC's interim criteria constituted a good first step. However, industry representatives

agreed that some areas of difficulty for industry still remain, such as the fuel rod failure threshold and coolability limit. Within these areas, EPRI representatives discussed that further resolution and clarification was needed. Industry representatives proposed to work with the NRC staff to address these issues effectively.

During the morning discussion, industry representatives focused on conservatism in the PCMI failure criteria. These presentations focused on the effects of Boiling Water Reactor (BWR) pulse width, cold test conditions, and the inclusion of mixed-oxide (MOX) test results. Although little new data was presented, the industry representatives described plans to further evaluate these items and incorporate the anticipated results from the Nuclear Safety Research Reactor (NSRR) hot capsule tests. The NRC staff provided feedback that the NSRR hot capsule tests should be helpful in addressing the temperature effects and finalizing the fuel failure threshold. Conflicting opinions still exist on the degree of MOX effects on fuel expansion and cladding strain. The NRC staff noted that simply ignoring the MOX tests (due to non-applicability to US plants) would eliminate important test results in an already limited database.

During the afternoon, industry representatives discussed the approach to address the core coolability criteria. The industry representatives presented an example on quantifying the amount of dispersed fuel and the mechanical energy generated from its interaction with the reactor coolant. It appears that modern analytical methods are available (some models already approved) which are capable of accurately predicting the number of failed fuel rods. However, the degree of confidence is lower on predicting the amount of fuel which would fragment and disperse within the reactor coolant system. Further, the empirical database related to the mechanical energy conversion is limited.

The Westinghouse representatives also made a presentation on the core coolability criteria. Its view is that the RIA long-term coolability concerns (e.g., fuel dispersal, blockage) are bounded by the loss-of-coolant accident (LOCA). The Westinghouse representatives also identified that the interim criteria precluding incipient fuel melt may be overly restrictive and would be a burden to implement. The Westinghouse representatives proposed an alternate criteria allowing limited centerline melting for at-power events. The NRC staff stated no hard objections to limited centerline melting. However, any new coolability criteria allowing centerline melt would still need to preclude molten fuel-to-coolant interaction, address fuel volumetric changes, and include a larger fission gas release within dose calculations.

The NRC staff summarized its concerns that a consensus has not been reached with regard to addressing fuel failure and core coolability and agreed that additional interactions and work are needed to reach an endpoint. In addition, the NRC staff agreed that addressing core coolability concerns will be a significant effort.

<u>Next Steps:</u>

- At the meeting conclusion, an EPRI representative stated its plans to submit a topical report(s) to generically address the RIA criteria by the end of 2009. The schedule for its submittal is tied to the anticipated NSRR test results.

- The next meeting will focus on the analytical models employed to predict fuel pellet expansion and cladding stress and strain during the RIA. Significant issues related to predicting cladding failure (e.g., ultimate strain versus uniform elongation, validation using

separate effects mechanical tests versus integral RIA test results) remain which must be resolved.

- A regulatory process and potential test procedure for evaluating the response of future fuel designs and cladding alloys to an RIA must be developed.

- A future meeting will focus of quantifying and validating fuel-coolant interaction.

Members of the public were present. One public meeting feedback form was received. The feedback form stated that although the room was comfortable, the projection of the slides on the overhead screen was too small to be legible. Particularly because there were a lot of detailed tables and charts in the industry presentation slides. In anticipation that some meeting attendees would not be able to see the tables or charts clearly, the NRC project manager ensured throughout the meeting that handouts of the presentation slides were provided to all attendees so that they would not have to rely solely upon the overhead to follow the presentation discussion. This public meeting feedback form was provided to the NRR Communications Analyst for further analysis and followup.

The meeting was adjourned.

Project No. 669

Enclosure: List of Attendees

cc w/encl: See next page

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ADAMS Package Number: ML073030218
Meeting Notice Accession Number: ML072550010
Meeting Handout Accession Numbers: ML072950134, ML072950122, ML072950112, ML072950107, ML072950249
Meeting Summary Accession Number: ML072990110 NRC-001

OFFICE	PSPB/PM	PSPB/LA	DSS/SNPB	PSPB/BC
NAME	TMensah	DBaxley	TMendiola	SRosenberg
DATE	10/ 31 /07	10/ 30 /07	11/ 08 /07	11/ 09 /07

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Date: November 9, 2007

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List of Attendees for October 16, 2007	
Name	**Organization**
John Alvis	Anatech Corp.
Charles Beard	Westinghouse
Wiafried Beck	AREVA
Carl Beyer	PNNL
Paul Clifford	NRC
RC Deveney	AREVA
Matt Eyre	PSEG
Charles Harris	NRC
W. Harris	Westinghouse
Charles Heck	General Electric (GE)
Jerry Holm	AREVA
Nayem Jahingir	Global Nuclear Fuels-Americas
Ralph Landry	NRC
Tanya Mensah	NRC
Ralph Meyer	NRC
David Mitchell	Westinghouse
Robert Montgomery	ANATECH/EPRI
Odelli Ozer	Electric Power Research Institute (EPRI)
Abid Rustaeg	SCE
Harold Scott	NRC
Al Strasser	Aquarius Services
Donald Todd	AREVA
Chris Van Wert	NRC
John Voglewede	NRC

ENCLOSURE

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