

September 30, 2005

LICENSEE: Tennessee Valley Authority (TVA)

FACILITIES: Browns Ferry Nuclear Plant, Units 2 and 3

SUBJECT: SUMMARY OF AUGUST 4, 2005, MEETING WITH FRAMATOME, ANP,  
AND TVA REGARDING APPLICABILITY OF FRAMATOME FUEL ANALYSIS  
METHOD FOR EXTENDED POWER UPRATE CONDITIONS  
(TAC NOS. MC6454 AND MC6455)

On August 4, 2005, the U.S. Nuclear Regulatory Commission (NRC) staff met with Framatome, ANP representatives in Richland, Washington. The objective of the meeting was to allow Framatome to provide additional information supporting the position that the extended power uprate (EPU) methodology used to perform analyses for the Browns Ferry Nuclear Plant (BFN), Units 2 and 3, cores is still valid at uprated conditions. The meeting was closed to the general public as a result of the proprietary nature of the information being discussed. Enclosure 1 contains a list of attendees, and Enclosure 2 is a nonproprietary copy of Framatome's handout distributed during the meeting.

#### BACKGROUND

By letter dated June 25, 2004, TVA, the licensee, submitted an amendment request for Units 2 and 3. The proposed amendment would change the Units 2 and 3 operating licenses to increase the maximum authorized power level from 3458 megawatt thermal (MWt) to 3952 MWt. This change represents an increase of approximately 15 percent above the current maximum authorized power level. The proposed amendment would also change the BFN Licensing Bases and any associated technical specifications for containment overpressure, removing the upper bound limitation on peak cladding temperature and revising the maximum ultimate heat sink temperature.

The NRC staff noted that the BFN EPU fuels analyses are a combination of analyses performed by both General Electric and Framatome. The meeting between the NRC staff, TVA and Framatome was held to allow Framatome to present their philosophy for determining whether the analytical methods and code systems are being applied within the NRC-approved applicability ranges for the neutronic and thermal-hydraulic conditions predicted for EPU conditions.

In a meeting held June 7 - 8, 2005, Framatome addressed the validity of calculational and measurement uncertainties applied in the thermal limits analyses for the predicted EPU neutronic and thermal-hydraulic core and fuel conditions. The presentations also addressed whether the analytical models and correlations simulating physical phenomena (e.g., critical heat flux correlations, void/quality correlations, two phase pressure drop correlations) were applied within the NRC-approved validation or benchmarking ranges.

## DISCUSSION

Framatome provided additional information regarding the CASMO4 and MICROBURN-B2 thermal hydraulic analysis codes. These two codes provide the neutronic input for the loss-of-cooling accident analysis, safety limit analysis, which is used to determine the minimum critical power ratio (MCPR) operating limit, and the safety limit MCPR. Framatome presented information regarding the capability of these codes of accurately characterizing the cross section of boiling-water reactor lattices at uprated power. The licensee indicated that, as a result of the low calculation uncertainty due to use of gamma scan data up to 90 percent void fraction, MICROBURN-B2 can handle the high void fraction calculations needed for EPU. It was also indicated that the Framatome resultant calculation showed a minuscule change in void fraction as a result of the uprated power. The NRC staff expressed concern that not enough data were available to support the contention that the codes characterization of the high void fraction generated cross section was accurate.

The NRC staff also questioned the safety limit analyses and what information went into its development. One question centered around the sensitivity of the analysis to correlation coefficient uncertainties from one fuel type to another. The licensee indicated that there was no significant change in characteristics from one fuel type to another.

At the conclusion of the meeting, the NRC staff and the fuel vendor acknowledged that the meeting was highly beneficial in improving the understanding of the issues. No commitments were made by the vendor and no regulatory decisions were made by the NRC staff during the proceedings. The NRC staff is preparing specific requests for additional information to address outstanding information needed to complete the evaluation methodology review.

**/RA/**

Eva A. Brown, Project Manager, Section 2  
Project Directorate II  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket Nos. 50-260 and 50-296

Enclosures: 1. List of Attendees  
2. Nonproprietary Version of  
Framatome Presentation

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**Regarding Fuel Analysis Methodology**  
**August 4, 2005**

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