

March 31, 2003

MEMORANDUM TO: Stephen Dembek, Chief, Section 2
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

FROM: Drew Holland, Project Manager, Section 2 /RA/
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

SUBJECT: SUMMARY OF JANUARY 30, 2003, MEETING WITH FRAMATOME
ANP ON TOPICAL REPORT BAW-10241(P), "THE BHTP DNB
CORRELATION WITH LYNXT" (TAC NO. MB7033)

On January 30, 2003, Framatome ANP met with the NRC staff in a closed meeting to discuss Topical Report BAW-10241(P), "The BHTP [HTP Spacer Grid Design] DNB [Departure from Nucleate Boiling] Correlation With LYNXT [thermal hydraulic computer code]." Both proprietary and non-proprietary handouts were provided to the staff. The non-proprietary handouts are available in ADAMS under Accession No. ML030340266. Framatome's meeting goals were to discuss the purpose of the topical report, describe the critical heat flux (CHF) correlation and limitations for the correlation. A list of meeting attendees is attached.

A significant number of fuel rod failures have occurred due to crossflow velocities through the slots and holes in the core baffle of B&W 177-FA plants. This has necessitated a change in spacer grid design. Small contact points between the grids and fuel rods has led to rod/assembly vibration resulting in cladding erosion near such high crossflow velocities. The HTP spacer grid design is a proven, mechanically robust design. The design allows line contact between the grids and fuel rods. This configuration will significantly improve the fuel rod protection at the core periphery.

The HTP CHF correlation is applicable for the HTP spacer grid design and was developed using the XCOBRA-IIIC thermal hydraulic code.

Progress Energy will be implementing the use of the HTP grid for the Crystal River 3 refueling outage in November of this year. The NRC-approved reload licensing tool set for Crystal River 3 reloads is the LYNXT thermal hydraulic code. LYNXT is described in Topical Report BAW-10156-A, Revision 1, "LYNXT Core Transient Thermal-Hydraulic Program."

Fuel design parameters for the HTP grid designed for the Mark-BHTP fuel are within the existing HTP correlation application range. The application of the HTP correlation in LYNXT requires benchmarking of the correlation data base using the LYNXT code and obtaining NRC approval.

Existing differences between XCOBRA-IIIC and LYNXT have resulted in larger than desirable differences in the 95/95 DNB limit with regard to water properties. The correlation coefficients were adjusted to obtain a data fit with LYNXT and XCOBRA-III.

The Crystal River 3 reload analysis will require NRC approval of BAW-10241(P) and BAW-10179(P), Revision 5, "Safety Criteria and Methodology for Acceptable Cycle Reload Analyses."

The contents of the topical report include an introduction and summary which discuss the range of applicability and compare the BHTP correlation to experimental measurements. Under the detailed BHTP DNB correlation section, the base correlation, the fuel design factor, and the non-uniform axial power distribution correction factor are discussed. The qualification of the BHTP DNB correlation addresses thermal-hydraulic models of test assemblies and calculation results and analysis of residuals. A statistical characterization of the BHTP DNB correlation is also provided in the topical report.

The HTP CHF documentation consists of EMF-92-153(P)(A) and EMF-92-153(P)(A) Supplement 1, "HTP: Departure From Nucleate Boiling Correlation for High Thermal Performance Fuel."

The description of the CHF correlations includes:

- CHF data obtained at Columbia University Heat Transfer Research Facility
- The differences between XCOBRA-IIIC and LYNXT resulted in different values for coefficients associated with enthalpy/mass and flux/quality/pressure to yield desired empirical fits
- The 95/95 safety limit for the BHTP correlation is determined to be 1.132
- A comparison of the predicted DNB heat flux to the measured DNB heat flux for the entire data base was made and is provided
- Significant other analyses and data comparisons

In summary, the BHTP correlation has been established based on the HTP correlation form and data base. The BHTP correlation shows a similar performance level as the HTP correlation and is identical to the HTP correlation with the exception of coefficients associated with enthalpy/pressure/mass and flux/quality terms. The BHTP correlation has been justified for use with the LYNXT code.

Stephen Dembek

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The staff expressed their appreciation for the presentation. No regulatory decisions were made.

Project No. 693

Attachment: Meeting Attendees

cc w/att:

Mr. James F. Mallay
Director, Regulatory Affairs
Framatome ANP, Richland, Inc.
2101 Horn Rapids Road
Richland, WA 99352

The staff expressed their appreciation for the presentation. No regulatory decisions were made.

Project No. 693

Attachment: Meeting Attendees

cc w/att:

Mr. James F. Mallay
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MEETING WITH FRAMATOME ANP

TOPICAL REPORT BAW-10241(P), "BHTP DNB CORRELATION APPLIED WITH LYNXT"

JANUARY 30, 2003

ATTENDANCE LIST

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PROGRESS ENERGY

L. Martin
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D. Holland
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