Framatome ANP
An Areva and Siemens Company

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Viewgraphs for a Meeting Between Framatome ANP and the NRC to discuss the Topical Report BAW-10241(P), Revision 1, "Extension of the BHTP CHF Correlation Ranges"

A proprietary and a non-proprietary copy of the viewgraphs to be presented at a meeting between the NRC and Framatome ANP to discuss the topical report BAW-10241(P), Revision 1, "Extension of the BHTP CHF Correlation Ranges" are provided with this letter.

Framatome ANP considers some of the information contained in the enclosure to this letter to be proprietary. As required by 10 CFR 2.390(b), an affidavit is enclosed to support the withholding of this information from public disclosure.

Sincerely,

Jerald S. Holm, Director
Regulatory Affairs

Enclosures

cc: M. C. Honcharik
Project 728

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AFFIDAVIT

COMMONWEALTH OF VIRGINIA)
) ss.
CITY OF LYNCHBURG)

1. My name is Gayle F. Elliott. I am Manager, Product Licensing in Regulatory Affairs, for Framatome ANP ("FANP"), and as such I am authorized to execute this Affidavit.

2. I am familiar with the criteria applied by FANP to determine whether certain FANP information is proprietary. I am familiar with the policies established by FANP to ensure the proper application of these criteria.

3. I am familiar with the information contained in "BHTP CHF Correlation Extensions and Extrapolations," dated May 2005, and referred to herein as "Document." Information contained in this Document has been classified by FANP as proprietary in accordance with the policies established by FANP for the control and protection of proprietary and confidential information.

4. This Document contains information of a proprietary and confidential nature and is of the type customarily held in confidence by FANP and not made available to the public. Based on my experience, I am aware that other companies regard information of the kind contained in this Document as proprietary and confidential.

5. This Document has been made available to the U.S. Nuclear Regulatory Commission in confidence with the request that the information contained in this Document be withheld from public disclosure.

6. The following criteria are customarily applied by FANP to determine whether information should be classified as proprietary:

(a) The information reveals details of FANP's research and development plans and programs or their results.

(b) Use of the information by a competitor would permit the competitor to significantly reduce its expenditures, in time or resources, to design, produce, or market a similar product or service.

(c) The information includes test data or analytical techniques concerning a process, methodology, or component, the application of which results in a competitive advantage for FANP.

(d) The information reveals certain distinguishing aspects of a process, methodology, or component, the exclusive use of which provides a competitive advantage for FANP in product optimization or marketability.

(e) The information is vital to a competitive advantage held by FANP, would be helpful to competitors to FANP, and would likely cause substantial harm to the competitive position of FANP.

7. In accordance with FANP's policies governing the protection and control of information, proprietary information contained in this Document have been made available, on a limited basis, to others outside FANP only as required and under suitable agreement providing for nondisclosure and limited use of the information.

8. FANP policy requires that proprietary information be kept in a secured file or area and distributed on a need-to-know basis.

9. The foregoing statements are true and correct to the best of my knowledge, information, and belief.

SUBSCRIBED before me this 12th

day of April, 2005.

Brenda C. Maddox

Brenda C. Maddox
NOTARY PUBLIC, STATE OF VIRGINIA
MY COMMISSION EXPIRES: 7/31/07

AREVA

BHTP CHF Correlation Extensions and Extrapolations

BAW-10241P, Rev. 1

Richard L. Harne
Thermal-Hydraulic Technology
Framatome ANP, Inc.

NRC Offices, Rockville, MD
May 3, 2005

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Agenda

- Comparison of BAW-10241P, Rev.1 to Previously Approved EMF-92-153, Rev.1

- Technical Review Schedule Need

EMF-92-153, Revision 1

► EMF-92-153, Revision 1

- Correlation range extensions and extrapolations deemed necessary for supporting plant operation
- HTP: Departure From Nucleate Boiling Correlation for High Thermal Performance Fuel
- Application T/H Code: XCOBRA-IIIC
- SER: January 2005

► HTP Range Extensions

- [ ] CHF data points from [ ] CHF tests in original correlation
- 1.141 CHF Design Limit
- [ ] additional CHF data points examined for 1400, 1000, and 600 psia covering [ ] of [ ] CHF tests
- 1000 and 600 psia data dropped because of limited coverage across only 5 CHF tests, leaving [ ] data points
- 3 data points for 1400 psia dropped, leaving [ ] data points
  - 2 points at low flow
  - 1 point at high thermodynamic quality
- Extensions Granted in SER
  - Low Pressure
  - Low Mass Flow Rate
  - High Thermodynamic Quality

EMF-92-153, Revision 1

► HTP Range Extrapolations

- Demonstrated the conservative behavior of the correlation predictions under high thermodynamic quality conditions below the original lower quality limit
  - SER granted the elimination of the lower quality limit

- Demonstrated the conservative behavior of the correlation predictions under pressures greater than the original high pressure limit
  - The proposed extension was modified during the review process
  - SER granted the specific and limited application of the correlation above the higher pressure limit
  - "When pressures greater than the upper pressure limit of 2425 psia but less than 2600 psia are encountered, all of the local coolant conditions are calculated at the upper pressure limit of 2425 psia using the NRC-approved thermal-hydraulic code and then used in the calculation of the HTP CHF."

BAW-10241, Revision 1

► BAW-10241, Revision 1

- BHTP DNB Correlation Applied with LYNXT
- Application T/H Code: LYNXT
- Submitted: March 2005

► BHTP Range Extensions

- [ ] CHF data points from [ ] CHF tests in original correlation
- 1.132 CHF Design Limit
- [ ] additional CHF data points examined for 1400, 1000, and 600 psia covering [ ] of [ ] CHF tests
- 1000 and 600 psia data dropped because of limited coverage across only 5 CHF tests, leaving [ ] data points
- 3 data points for 1400 psia dropped, leaving [ ] data points
  - 2 points at low flow
  - 1 point at high thermodynamic quality
- Extensions requested, using data
  - Low Pressure
  - Low Mass Flow Rate
  - High Thermodynamic Quality

▶ BHTP Range Extrapolations

- The original HTP CHF correlation application for the additional [ ] data points was ~10% conservative.
- The BHTP CHF correlation application for the additional [ ] data points was roughly ~24% conservative.
- Therefore, the analytical conclusions observed for the HTP correlation are appropriate for the BHTP correlation extensions in lower quality and higher pressure.
- Framatome ANP is requesting the same extensions for lower quality and higher pressure.
  - Elimination of the lower thermodynamic quality limit.
  - "When pressures greater than the upper pressure limit of 2425 psia but less than 2600 psia are encountered, all of the local coolant conditions are calculated at the upper pressure limit of 2425 psia using the NRC-approved thermal-hydraulic code and then used in the calculation of the BHTP CHF."

Range Comparison Summary

- ***The requested application ranges for the BHTP correlation are consistent with those granted for the HTP correlation***

		HTP EMF-92-153, Rev.1 (Granted in SER)	BHTP BAW-10241, Rev.1 (Requested in Submittal)
Extensions			
System Pressure	psia	**1385** - 2425	**1385** - 2425
Mass Flow Velocity	Mlb_m/ft^2	**0.498** - 3.573	**0.492** - 3.549
Thermodynamic Quality		**Up to 0.515**	**Up to 0.512**
Extrapolations			
High Pressure	psia	**Limited and Specific Application up to <2600 psia** [1]	**Limited and Specific Application up to <2600 psia** [1]
Thermodynamic Quality		**No Lower Limit** [2]	**No Lower Limit** [2]

[1] : When pressures greater than the upper pressure limit of 2425 psia but less than 2600 psia are encountered, all of the local coolant conditions are calculated at the upper pressure limit of 2425 psia using the NRC-approved thermal-hydraulic code and then used in the calculation of the HTP (or BHTP) CHF.

[2] : Any other extrapolation requires a plant-specific review (according to SER)

Technical Review Schedule Need

- *Entergy's ANO-1 Cycle 20 (startup Fall 2005) will contain the Mark-B-HTP fuel design requiring the use of the BHTP CHF correlation*
- *The generation of the 2 RC pump operating condition DNB-based safety limits (Tech Specs) revealed some situations where the local coolant mass velocity fell below the 0.897 $Mlb_m/hr\text{-}ft^2$ lower velocity limit from BAW-10241(A) Revision 0.*
- *Framatome ANP has requested in BAW-10241, Rev.1 the same correlation extensions and extrapolations for the BHTP correlation that were granted for the HTP correlation.*
- *Framatome ANP has requested an NRC review with an SER by August 1, 2005 to support plant operation.*