Extension of ABB-NV Correlation and Modified ABB-NV Correlation (WLOP) as W-3 Alternate

Pre-Submittal Meeting

May, 2006

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Agenda

- Objectives of the Meeting
- Background Information on ABB-NV and W-3
- ABB-NV Extension to Westinghouse PWR Fuel Designs
- ABB-NV Modification for Low Pressure (WLOP)
- Planned licensing submittal
- Summary

Objectives of the Meeting

- Present ABB-NV correlation extension for non-mixing grid region for Westinghouse Pressurized Water Reactors as W-3 alternate
  - Limited axial region below the first mixing vane grid
- Present ABB-NV modification for Low Pressure Conditions for Steamline Break Analyses as W-3 alternate
  - Condition IV event analyzed with Condition II DNBR limit
- Propose planned topical submittal and schedule
  - Addendum to WCAP-14565-P-A for both ABB-NV extension and modified ABB-NV correlation
- Obtain NRC feedback

Background - ABB-NV DNB Correlation

- Developed based on test data from rod bundles for fuel designs with non-mixing vane (NMV or NV) grids
  - With TORC (CENPD-387-P-A, 2000)
  - With VIPRE (WCAP-14565-P-A Addendum 1-A, 2004)
- Database consists of more than 700 points
  - Typical (Matrix) and thimble test bundles
  - Different axial power distributions
- 95/95 DNBR limit of 1.13 for CE-PWR fuel designs

Background - W-3 DNB Correlation

- Developed in 1960's based on test data from single tube and annular geometry
- Validated to be conservative for rod bundles
  - Cold wall and non-uniform axial power factors
  - Grid benefit not credited
- Used with THINC, VIPRE and other subchannel codes
- Relatively high 95/95 DNBR limits (WCAP-9226-P-A Rev.1)
  - 1.30 (1000 – 2400 psia)
  - 1.45 (500 – 1000 psia)

Background - Current W-3 Applications

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ABB-NV Extension to Westinghouse PWR

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ABB-NV Extension Database

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ABB-NV Extension Range of Applicability

a, c

ABB-NV Extension – Design Applications

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ABB-NV Modification (WLOP)

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ABB-NV Modification (WLOP) – CHF vs Pressure

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ABB-NV Modified Form (WLOP)

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WLOP Correlation and Validation Database

WLOP Correlation Qualification

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WLOP Correlation and Validation Database Results

WLOP Correlation MV Demonstration Database Results

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WLOP Range of Applicability

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WLOP – Design Applications

a, c

Planned Licensing Submittal

a, c

Submittal Outline

Planned Schedule

a, c

Summary

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