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Supplement 4 to the Westinghouse BWR ECCS Evaluation Methodology

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Licensing Pre-submittal Meeting

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Outline

- Objective
- Introduction/Background
- Purpose of Supplement 4
- Proposed Changes
- Table of Contents for Topical Report
- Impact on Current Results
- Outlook on Timetable

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Objective

- The objective is to present an overview of Westinghouse plans about the BWR LOCA Methodology updates.

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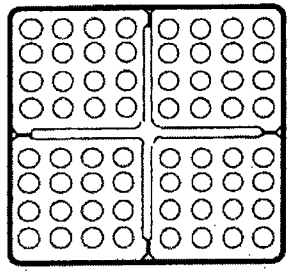
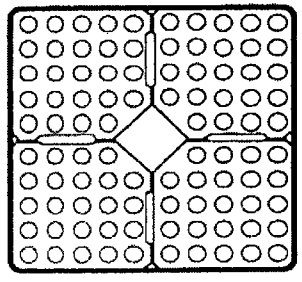
Introduction/Background

- The current methodology was originally approved in 1989 and most recently updated in 2004 for partial rod introduction with Optima2 fuel:
  - USA1
    RPB-90-93-P-A and RPB-90-94-P-A
    SVEA-64



  - USA2
    CENPD-283-P-A and CENPD-293-P-A
    SVEA-96 / SVEA-96+
    Applied to Columbia and Hope Creek



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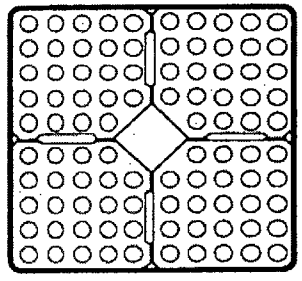
Background (cont.)

- USA4

  WCAP-15682-P-A

  relaxation of rod-to-rod touching model

  also applied to Hope Creek



- USA5

  WCAP-16078-P-A

  Optima-2 with partial rods

  applied to Quad Cities/Dresden

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Background (cont.)

- The methodology is based on the compliance with 10CFR50 Appendix K:
  - 1.02 times the licensed power
  - ANS '71 decay heat +20%
  - Metal-water reaction using Baker-Just equation
  - Moody break flow
  - consideration of most-limiting single failure
  - conservative containment pressure
  - zero heat transfer from uncovery until rated spray
  - prescribed spray and reflood HTCs

Purpose of Supplement 4

- Supplement 4 to the methodology has mainly 3 purposes:
  - Address the excessive conservatism issue in heat transfer after the end of lower plenum flashing but before the spray cooling period;
  - Make the conservatively calculated containment backpressure part of the documented methodology;
  - Clarify some aspects of the methodology in the actual performance of LOCA calculations.

Proposed Changes

- Westinghouse methodology uses adiabatic convective HTC for the time after the end of lower plenum flashing but before the spray flow reaches the rated conditions, consistent with the recommendation of the Appendix K.

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Proposed Changes (cont.)

- 10CFR50 Appendix K Requirement D.6 states:

  Convective Heat Transfer Coefficients for Boiling Water Reactor Fuel Rods Under Spray Cooling. Following the blowdown period, convective heat transfer shall be calculated using coefficients based on appropriate experimental data. For reactors with jet pumps and having fuel rods in a 7×7 fuel assembly array, the following convective coefficients are acceptable:

  a. During the period following lower plenum flashing but prior to the core spray reaching rated flow, a convective heat transfer coefficient of zero shall be applied to all fuel rods.

Proposed Changes

- Use of zero HTC during the period following lower plenum flashing but prior to core spray reaching rated flow is very conservative.
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Proposed Changes (cont.)

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Proposed Changes (cont.)

- Use of conservatively calculated containment backpressure is acceptable according to Appendix K.
- Westinghouse developed a BWR Containment Methodology using GOTHIC code.
- Upon approval of WCAP-16608-P, the text of the LOCA EM will be modified to reflect this change.

Additional Clarifications

- Administrative cleanup of references to various topical reports will be documented
- Application of the methodology will be presented more *transparently* using a "road map".
- Clarification on some aspects of the methodology which are not explicitly discussed in current topical reports will be provided.

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Additional Clarifications (cont.)

- Two important ones are:
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Additional Clarifications (cont.)

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Additional Clarifications (cont.)

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Additional Clarifications (cont.)

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Table of Contents for Report

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Table of Contents for Topical Report (cont.)

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Impact on Current Results

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Outlook on Timetable

- Pre-submittal meeting – today
- Submittal of WCAP-16865 – 12/20/07
- Walkthrough of the submittal – 1/30/08
- RAI's – TBD
- Responses to RAI's – TBD
- Draft SER – TBD
- Final SER – TBD

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