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Containment Backpressure Application to Westinghouse U.S. BWR ECCS Evaluation Methodology

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Outline

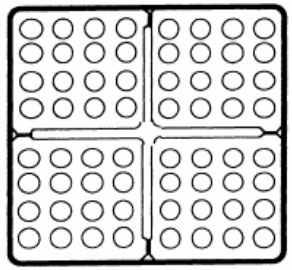
- Objective
- Current Methodology
- Compliance with Appendix K
- Containment B.C. in LOCA Analysis
- Supporting Containment Analysis Method
- Biasing for Low Pressure
- Anticipated Impact
- Licensing Plan

Objective

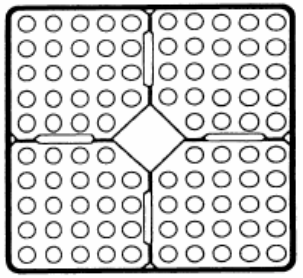
- The objective is to inform the NRC about Westinghouse plans for crediting containment backpressure in BWR ECCS evaluation calculations.

Current Methodology

- **USA1**
  RPB-90-93-P-A and RPB-90-94-P-A
  SVEA-64

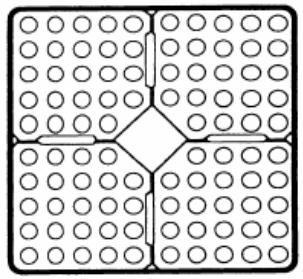


- **USA2**
  CENPD-283-P-A and CENPD-293-P-A
  SVEA-96 / SVEA-96+
  Applied to Columbia and Hope Creek



Current Methodology (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

Compliance with 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

Containment B.C. in LOCA

- **Current methodology conservatively assumes atmospheric pressure boundary condition in the containment:**

  I.D.2. Containment Pressure – GOBLIN analyses will conservatively assume atmospheric pressure in the containment volume throughout the LOCA transient. This assumption adequately addresses the requirements for this feature of Appendix K.

Containment B.C. in LOCA (cont.)

- **10CFR50, Appendix K states:**

  2. ***Containment Pressure.***
     The containment pressure used for evaluating cooling effectiveness during reflood and spray cooling shall not exceed a pressure calculated conservatively for this purpose. The calculation shall include the effects of operation of all installed pressure-reducing systems and processes.

Supporting Containment Analysis Method

- **Conservative containment pressure for LOCA will be calculated using GOTHIC model.**

- **Both the LOCA blowdown M&E calculation and the containment model will be biased to give low containment pressure.**

Biasing for Low Pressure

- **SRP Section 6.2.1.5 provides guidance for minimum containment pressure analysis for PWR. It will be followed as appropriate. The differences for BWR will be adequately addressed.**
  - **Initial containment internal conditions**
  - **containment volume**
  - **active heat sinks (spray, spilled ECCS)**
  - **pressure suppression**
  - **passive heat sinks**

- **Conservative LOCA M&E release will be used**

Anticipated Impact

- **Comparison using containment pressure from NPSH indicated that overall system response is minimally affected.**
- **There would be more liquid retained in the vessel at the end of blowdown, and the midplane recovery occurs earlier.**

Licensing Plan

- **Proposed schedule:**
  - **May 2006 – kickoff meeting**
  - **June 2006 – formal documentation**
  - **August 2006 – resolution of issues**
  - **September 2006 – expected approval**

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