



## Containment Performance

RIC 2008 Technical Issues/Systems Session

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## Outline

- GDC 50—Containment design basis
- GDC 38—Containment heat removal
- Suppression pool bypass
- Containment mixing (primary and secondary)
- Mass and energy release
- Analytical methods

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## GDC 50—Containment Design Basis

- Designed to accommodate LOCA pressures and temperatures
- Implemented the duration of accident for 30 days after a LOCA
- New reactor designs generally show results for 3 days
- Regulatory treatment of non safety systems (SECY-94-084)

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### GDC 38–Containment Heat Removal

- Rapidly reduce containment pressure and temperature after a LOCA
- Reduced to half the design pressure in 24 hours after a LOCA for PWRs
- Regulatory challenges:
  - Confirming plants meet GDC 38
  - Verifying assumptions (bypass and mixing)
  - Regulatory treatment of non safety systems

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### Suppression Pool Bypass

- Bypass leakage must be incorporated into Technical Specifications
- Regulatory challenge: verifying the assumed bypass leakages by testing
- Bypass affects ESBWR containment heat removal

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### Suppression Pool Bypass (cont.)

- Staff's analyses showed ESBWR containment pressure is sensitive to bypass assumptions
- Regulatory position: measured bypass leakage < 10% of assumed design value

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### Containment Mixing (Primary and Secondary)

- Assumptions in containment analyses and combustible gas control
- Regulatory challenges:
  - Confirming containment mixing as required for combustible gas control
  - Verifying assumptions in primary and secondary containment analyses
- Methods to show mixing: analysis supported by tests

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### Containment Mixing (cont.)

- EPR's credit for primary containment mixing
- AP1000 primary containment mixing:
  - Westinghouse test data and analysis
  - Staff confirmatory analysis
  - Limited credit taken
- ESBWR secondary containment (reactor building) mixing

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### Mass and Energy Release

- Heat removal from reactor core, reactor system metal and steam generators
- Steam quenching by ECCS water
- Regulatory Challenges:
  - EPR w/o safety related containment cooling fans or containment sprays
  - EPR credit on steam quenching compared to operating PWRs

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### Analytical Methods

- Evaluating containment performance
- Regulatory challenges:
  - Reviewing new design features
  - Reviewing design and modeling changes
- Comparisons to test data
- Staff confirmatory analyses and audits
- Effect on schedules

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### Conclusion

- Plant designs must show compliance with GDC 38 and 50
- Plant designs should show adequate containment mixing
- Significant staff resources are spent in evaluating analytical methods

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