

RIC 2009
Containment Sump Design

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Agenda

- Background
- Downstream Effects
- ITAAC
- Conclusion

Background

- Operating reactors are in the final stages of addressing GL 2004-02
- Five new reactor designs in review
- Several Combined License applications

Background (cont.)

- Regulation
 - 10 CFR 50.46(b)(5):
 - Requires Long-Term Cooling
 - Maintain core temperature at an acceptably low value
 - GDC 35:
 - Requires Emergency Core Cooling
 - Provide abundant emergency core cooling to transfer heat from the reactor core
 - GDC 38:
 - Requires Containment Heat Removal
 - Rapidly reduce containment pressure and temperature

Background (cont.)

- Guidance
 - RG 1.206
 - Establishes content of DCD and FSAR
 - RG 1.82, Rev. 3
 - Describes acceptable methods for implementing requirements
 - NEI 04-07 Guidance Report and SE
 - Methodology document that provides basic guidance on approach and various methods available
 - PWROG Technical Reports (WCAPs)
 - WCAP 16793 - In-Vessel Downstream Effects
 - WCAP 16406 - Ex-Vessel Downstream Effects
 - WCAP 16530 - Chemical Effects

Key Technical Issues

- Presenters asked to provide their perspectives on the following topics:
 - Downstream Effects
 - How do you envision bringing the downstream effects issue to resolution?
 - What are the impediments?
 - How can they be overcome?

Key Technical Issues

– Inspection, Testing, Analyses and Acceptance Criteria (ITAAC):

- What do you see as the role of ITAAC in verifying key assumptions associated with materials (insulation, coatings, latent debris) in containment?
- What level of detail do you see needed for inspecting installed debris interceptors and screen components?

Downstream Effects

• Staff Challenges during reviews

- Debris source term
- Testing
- In-Vessel guidance not final
- In some cases detailed design not complete

Downstream Effects

• Staff Expectations for DC and COL

- Specify debris source term in FSAR
- Evaluate wear and plugging of components
 - pumps, valves, heat exchangers etc.
- Provide report on prototypical fuel testing
- Identify approach in areas where detailed design is not complete

ITAAC

- Staff Challenges during review
 - Adequacy of Design Commitments
 - Clarity in Acceptance Criteria
 - Acceptance Criteria not linked to analysis and testing

ITAAC

- Staff Expectations:
 - Design Commitments include
 - Basic configuration (functional arrangement)
 - Containment debris source term (LOCA generated and pre-LOCA debris)
 - Acceptance Criteria are specific and measurable
 - Include type, quantity, size (area, height, volume), location, and physical arrangement per figures and drawings, as appropriate
 - Coupled to testing and analysis

Conclusion

- Provide key design features and operating strategies
- Perform testing and analysis consistent with NEI 04-07 and related guidance
- For key programmatic items provide specific COL items
- For key design characteristics provide ITAAC
- Include the general description, the design basis and limits for operation and the safety analysis in the FSAR

Conclusion

- Design must demonstrate compliance with 10CFR50.46(b)(5), GDC 35, and 38
- Provide information consistent with RG 1.206, RG 1.82 Rev. 3, NEI 04-07 and related guidance
- Sufficient detail is needed in the licensing documents in order to establish a clear licensing and design bases that provides foundation for final safety conclusion
