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Combustible Gas Control Considerations for the SMR-300 In-Containment Spent Fuel Pool

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Presented by: Cade Gersten and Monica Haneman

SMR, LLC, A Holtec International Company
Krishna P. Singh Technology Campus
One Holtec Boulevard
Camden, NJ 08104, USA

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Meeting Agenda

- Open Session
  - Meeting Purpose and Expected Outcome
  - Review and Interpretation of Regulatory Requirements and Guidance for Combustible Gas Control
- Closed Session
  - Overview of SMR-300 Design Features that Prevent Spent Fuel Pool Uncovery
  - Risk of Spent Fuel Uncovery in Beyond-Design-Basis Accidents
  - Conclusion

Meeting Purpose & Expected Outcome

- Purpose:
  - Present the technical basis for excluding the spent fuel pool (SFP) fuel from the SMR-300 Combustible Gas Control System (CGC) design considerations under 10 CFR 50.44
- Outcome:
  - Confirm regulatory expectations regarding SFP fuel considerations under 10 CFR 50.44
  - Establish mutual understanding of the path forward for the SMR-300 CGC design considerations

Review and Interpretation of Regulatory Requirements and Guidance for Combustible Gas Control

Combustible Gas Control – Regulatory Requirement

- 10 CFR 50.44 “Combustible Gas Control for Nuclear Power Reactors”
- § 50.44(c) requires future water-cooled reactors to consider:
  - Hydrogen generation equivalent to that from a fuel clad-coolant reaction involving 100% of the fuel cladding surrounding the active fuel region.
  - During this beyond-design-basis accident (BDBA) scenario, the containment must maintain:
    - Hydrogen concentration < 10%
    - Structural integrity
    - Appropriate accident mitigating features
- There is no separate regulatory requirement for combustible gas control for the SFP.

Combustible Gas Control – Regulatory Guidance

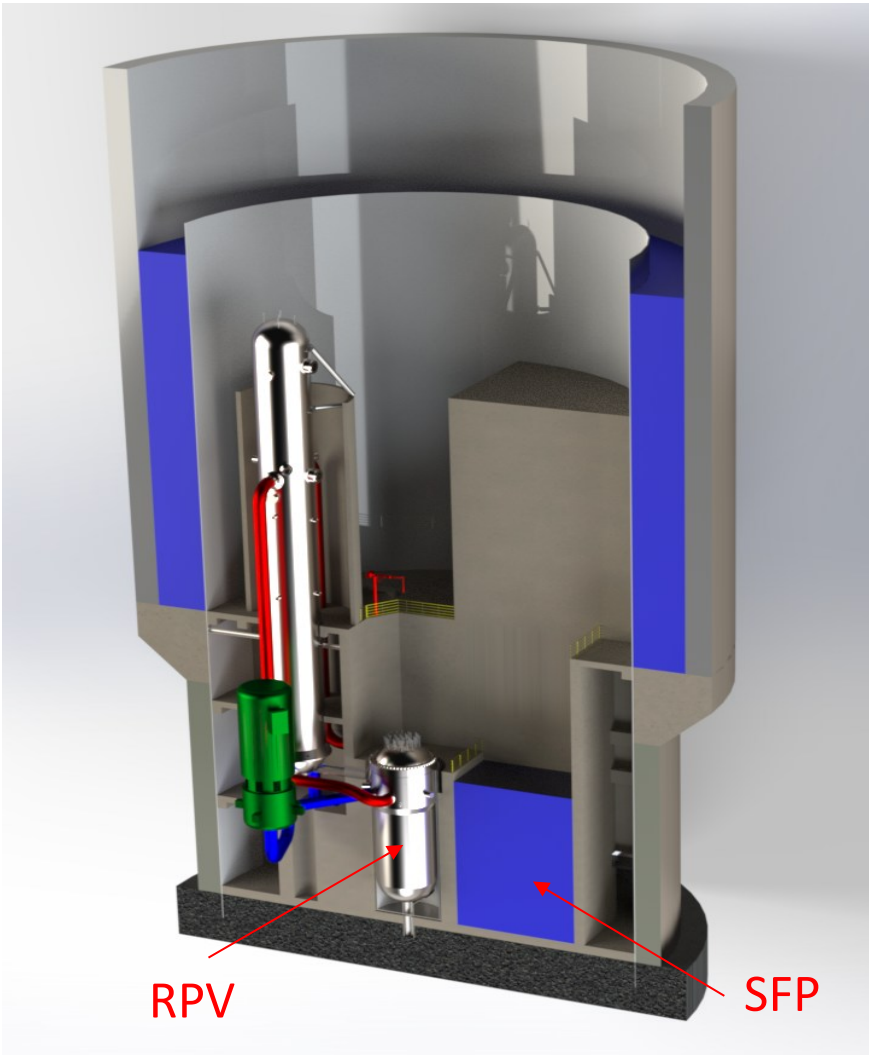
- NUREG-0800, Section 6.2.5 “Combustible Gas Control in Containment” and RG 1.7 “Control of Combustible Gas Concentrations in Containment” both state:
  - After an accident, combustible gas is predominately generated within the containment as a result of:
    a) Fuel clad-coolant reaction between the fuel cladding and the reactor coolant.
    b) Molten core-concrete interaction in a severe core melt sequence with a failed reactor vessel.
- NUREG-0800, Chapter 9 “Auxiliary Systems” and its Sections on SFP do not address combustible gas control for the SFP.
- RG 1.13 “Spent Fuel Storage Facility Design Basis” does not address combustible gas control for the SFP.

Interpretation of Scope of 10 CFR 50.44

- Historically, the requirements for combustible gas control apply to fuel in the reactor core and not fuel in the SFP.
  - ✔ As discussed, the regulatory requirements and guidance do not address fuel in the SFP as a source for hydrogen generation in BDBAs.
- SMR-300 will have a CGC that utilizes Passive Autocatalytic Recombiners (PARs) to account for hydrogen generated from a clad-coolant reaction in the core.

Unique Considerations for SMR-300 SFP

- SMR-300 features a unique design with Reactor Pressure Vessel (RPV) and SFP inside containment.
- Despite this design, SFP fuel is not a credible source of hydrogen generation as **the risk of SFP uncovery is demonstrably negligible.**
  - ✓ Justification that this risk is negligible is provided in the closed session slides.



Questions