Enclosure :

"NuScale CIRLT-RAI 9474," PM-0718-61172

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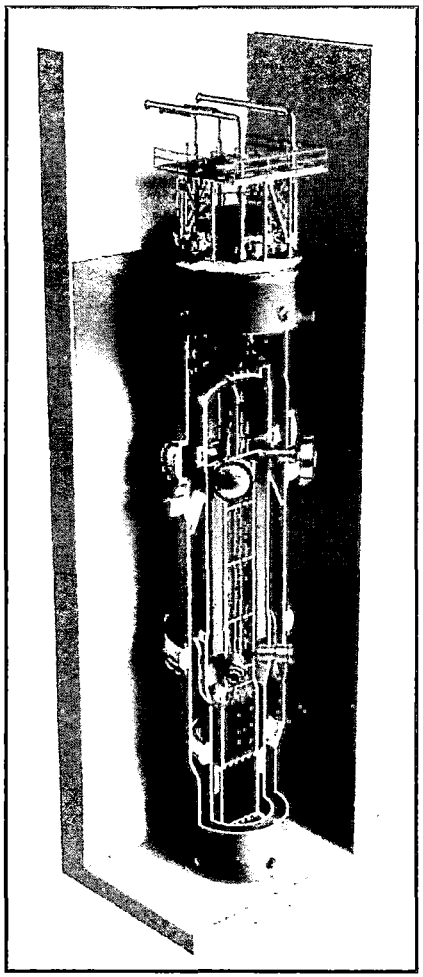
NuScale CILRT – RAI 9474



July 25th, 2018

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PM-0718-61172
Revision: 0

NUSCALE POWER™
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Agenda

- Recap of proposed RAI response
  - Preservice Design Pressure Leakage Test
  - CNV flange analysis
  - ITAAC
  - Response summary
- Refueling Overview (video)
- Closed Session (proprietary)
  - Screenshots of flange analysis model
  - Additional slides for refueling discussion if needed

CILRT

- 10 CFR Part 50, Appendix J Testing
  - Type A (vessel test at accident pressure – NuScale seeks exemption)
  - Type B (containment penetrations)
  - Type C (containment isolation valves)
- In lieu of a Type A test, NuScale is proposing a preservice design pressure leakage test
  - Purpose: Verify design of flange seals through leak test at design pressure

Preservice Design Pressure Leakage Test

- Test Characteristics
  - CNV assembled with all flanges in place
  - Take place in factory or onsite (must be out of RXB pool)
  - Test will use final design flanges, bolting material (with design preload), and design seals
  - Test will be performed with water as the pressure medium (similar to hydrotest)
  - Test occurs at containment design pressure

Preservice Design Pressure Leakage Test

- Acceptance Criteria
  - Design pressure must be held for a minimum of 10 minutes prior to start of inspection
  - Pressure will be maintained at or above design pressure for the time needed to visually inspect each vessel flange for leakage past outer flange seal
  - Successful test is no visible leakage at bolted connections
  - Similar to code requirements for a hydrotest
- Subsequent Modules
  - Test may be modified so that upper and lower can be tested separately

CNV Bolting Analysis

- Updating the Containment Vessel Flange Bolting Calculation for new scope:
- Add analysis to demonstrate that inner o-ring seal contact is maintained for all CNV bolted flanges when internal containment is at design pressure when considering accident thermal transient conditions
- Add analysis to demonstrate that lifting and moving the module does not stress CNV bolted flanges in a manner that contributes to flange distortion or seal positioning that would create leakage
- Add assessment to show results of testing under ambient temperature conditions

CNV Bolting Analysis

- Models of the bottom, middle, and top of the CNV, similar to the CNV ultimate pressure integrity calc, are used. Each type of bolted flange connection is modeled
- Stud, nuts, washers and threaded inserts are included in the mode with contact defined between the nuts-washers, washers-flange, and cover-flange
- All bolted connection preloads are calculated with margin over minimum preload need to maintain a tight joint
- Thermal transient analyzed to obtain temperature distribution through CNV for inadvertent RRV opening and CVCS injection line break transients
- The design pressure will be applied with temperature occurring at the time of peak accident pressure.

ITAAC 02.01.07

- Design Commitment
  - The CNV serves as an essentially leak-tight barrier against the uncontrolled release of radioactivity to the environment.
- Inspections, Tests, Analyses
  - A leakage test will be performed of the pressure containing or leakage-limiting boundaries, and CIVs.
- Acceptance Criteria
  - The leakage rate for local leak rate tests (Type B and Type C) for pressure containing or leakage-limiting boundaries and CIVs meets the requirements of 10 CFR Part 50, Appendix J.
- This ITAAC will be modified to include Acceptance Criteria for the preservice leak test at design pressure, with clarifying details added to Tier 2, Section 14.3.

Summary of RAI 9474 Response

- Update to Technical Report to update leakage assessment program (TR-1116-51962)
- Update FSAR 3.8.2.7
- Update FSAR 6.2
- Update Type A Test Exemption
- Update ITAAC Table 2.1-4
- Update Table 14.3-1 to match ITAAC
- Submit responses to RAI 9474, Questions 06.02.06-22 through 06.02.06-26