



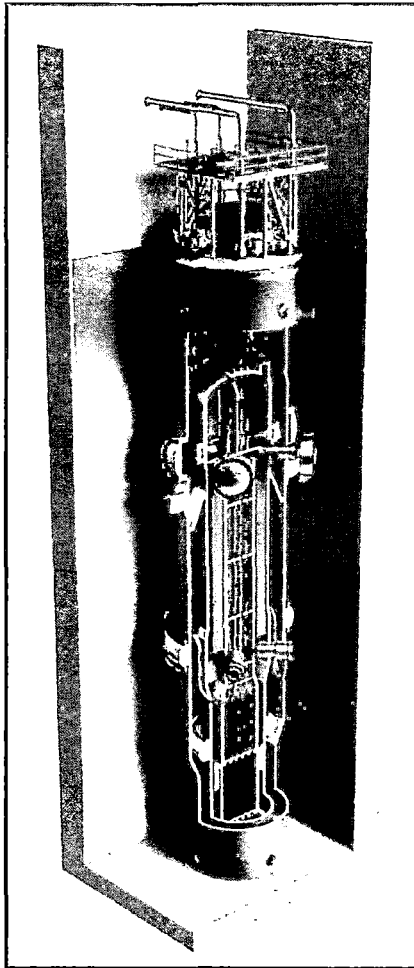
LO-0718-61173

**Enclosure :**

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

NuScale Nonproprietary

# NuScale CILRT – RAI 9474



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*Scott Harris*  
*Gary McGee*  
*Ed Heald*  
*Corrie Nichol*

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# Agenda

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- 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

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- 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

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- 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

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- 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

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- 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

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- 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 model 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

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- 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

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- 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