Enclosure:

"ACRS Full Committee Presentation: NuScale – Steam Generator Design," PM-0220-69051, Revision 0

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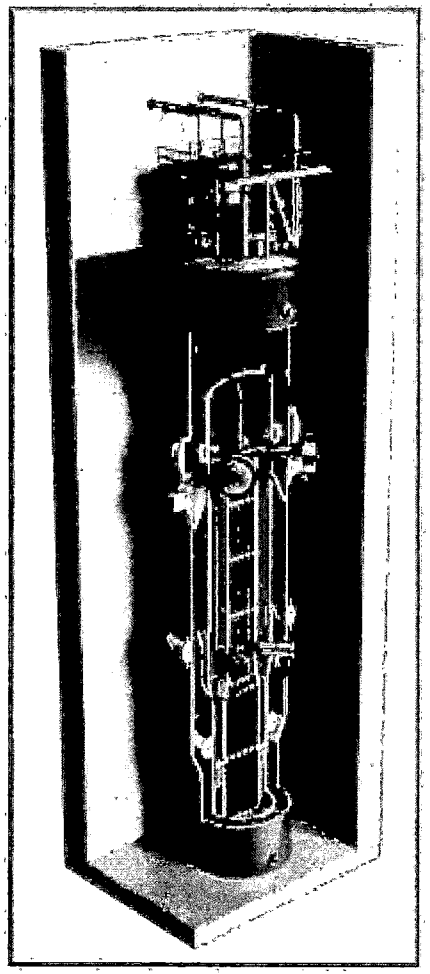
ACRS Full Committee Presentation



NuScale

Steam Generator Design

March 5, 2020

PM-0220-69051
Revision: 0

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Template #: 0000-21727-F01 R5

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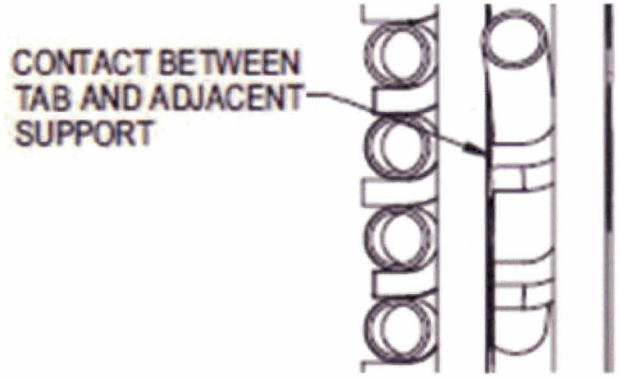
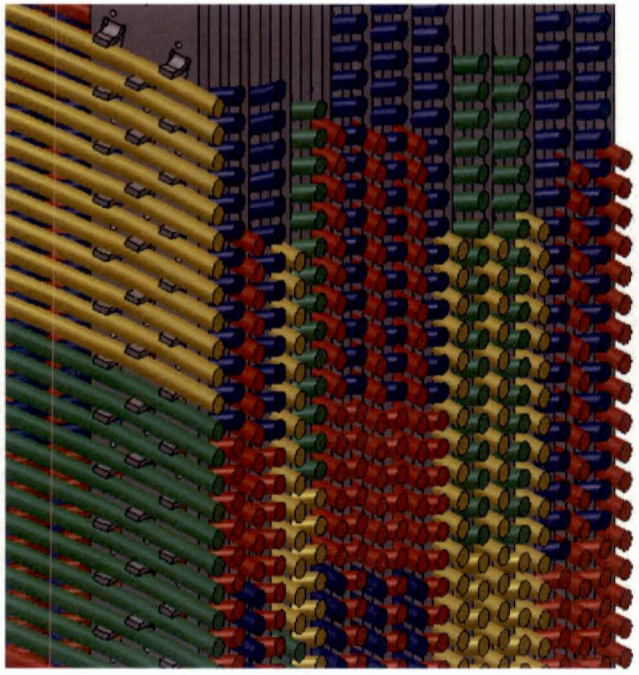
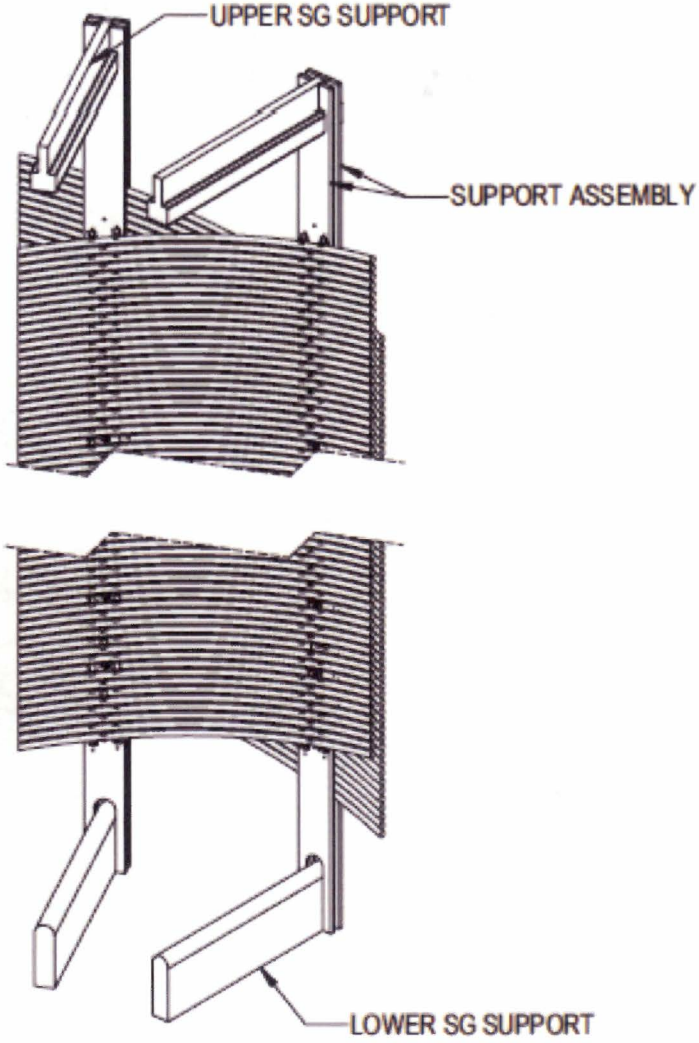
Agenda

- Steam Generator Design
- DCA Revisions

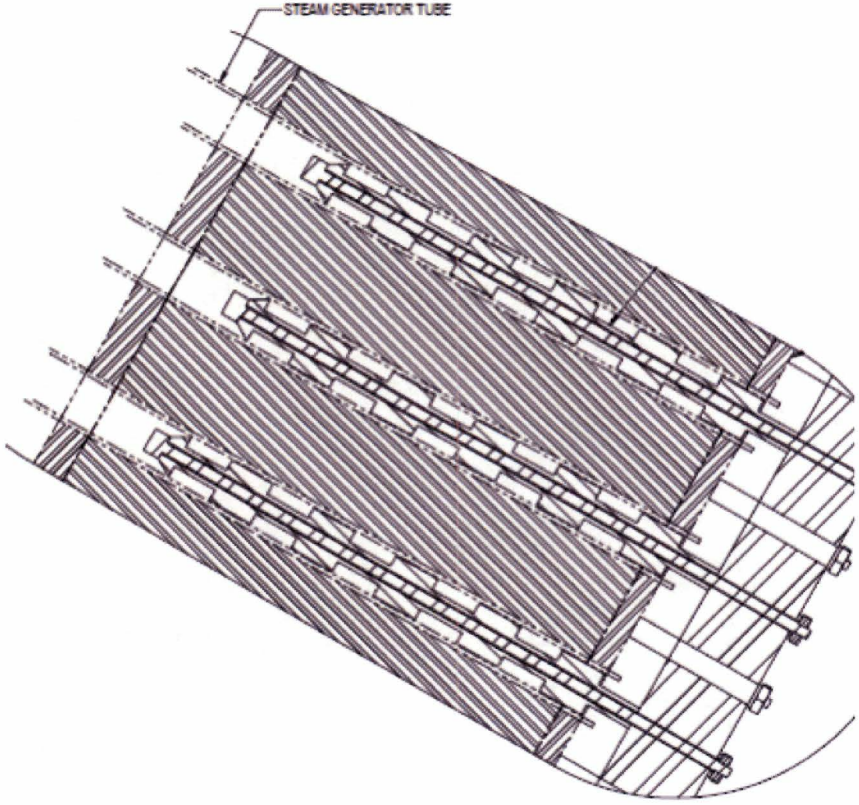
Steam Generator Design



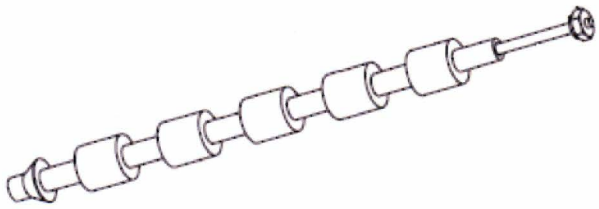




Steam Generator Inlet Flow Restrictor



IFR in Tubesheet



Inlet Flow Restrictor (IFR)

Steam Generator Design

- **Integral Helical Coil SG Design features**
  - Shell side is primary side - Tube side is secondary side
  - Alloy 690 TT (1380 tubes, 74 – 86 ft long, 5/8" OD)
  - Low flow in primary (~1ft/sec)
  - Tube wall degradation allowance (0.010" > ASME min wall)
  - Support 100% volumetric inspection
  - Normal access to shell side of tubes from below during refueling
- **Steam Generator Program and In-service Inspections**
  - Follow guidance of NEI 97-06 & EPRI (COL Item 5.4-1: Develop and implement a SG Program)
- **SG is designed with a flow restrictor at tube inlet to reduce the potential for density wave oscillations (DWO)**

DCA Revisions

- An Action Item has been established for the Combined License applicant (COL Item 3.9-14)

  A COL applicant that references the NuScale Power Plant design certification will develop an evaluation methodology for the analysis of secondary-side instabilities in the steam generator design. This methodology will address the identification of potential density wave oscillations in the steam generator tubes, and qualification of the applicable portions of the reactor coolant system integral reactor pressure vessel and steam generator given the occurrence of density wave oscillations, including the effects of reverse fluid flows within the tubes.

DCA Revisions (cont'd)

- FSAR Section 3.9 has been revised and establishes a COL Item for development of an evaluation methodology for analysis of secondary side instabilities.
- FSAR Section 5.4 clarifies language related to secondary side instabilities.

NuScale Conclusion

- The successful completion of ITAAC and the COL Item constitutes the basis for the NRC determination to allow operation of a facility certified under 10 CFR 52

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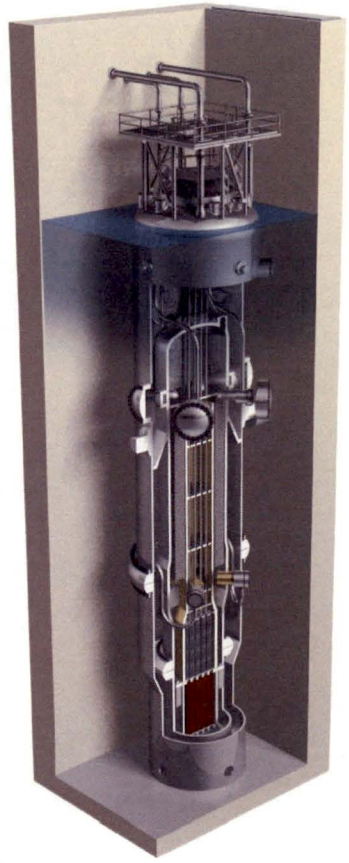

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Backup Material

ITAAC Closure Path for DWO

- Resolution of DWO is to be achieved through ITAAC activities related to the steam generator
- Tier 1 Table 2.1-2 defines the NuScale Power Module (NPM) ASME Code Class 1, 2, 3, and CS components that comply with ASME Code Section III requirements including:

Equipment Name	ASME Code Section III
RCS Integral RPV/SG/Pressurizer	1

- Number 02.01.01 specifies that "each ASME Code Class 1, 2, and 3 component (including piping systems) of a nuclear power plant requires a Design Report in accordance with NCA-3550"

ITAAC Closure Path for DWO (continued)

- An ITAAC inspection is performed of the NuScale Power Module "ASME Code Class 1, 2, 3, and CS as-built component Design Reports to verify that the requirements of ASME Code Section III are met"
- From Subsection NCA of the 2013 Edition of the ASME Code –
  - NCA-2142.2 requires that Design Specifications identify all loadings (e.g. pressure, temperature, mechanical loads, cycles, and/or transients) and the service limits a component will experience
    - Loading combinations for the RPV (including SG tubes) defined in Table 3.9-3 of DCA
    - Transient (TH) loads are based on time history of design basis transients, described in DCA Section 3.9.1.
  - NCA-3254 and 3255 provide additional information about design specifications
  - NCA-3260 requires that the Design Report evaluate the loads as defined in the design specification