Enclosure 2:

"Reactor Vessel Flange Tool (RFT) Design Plan and Schedule," PM-0219-64475-NP, Revision 0, Nonproprietary version

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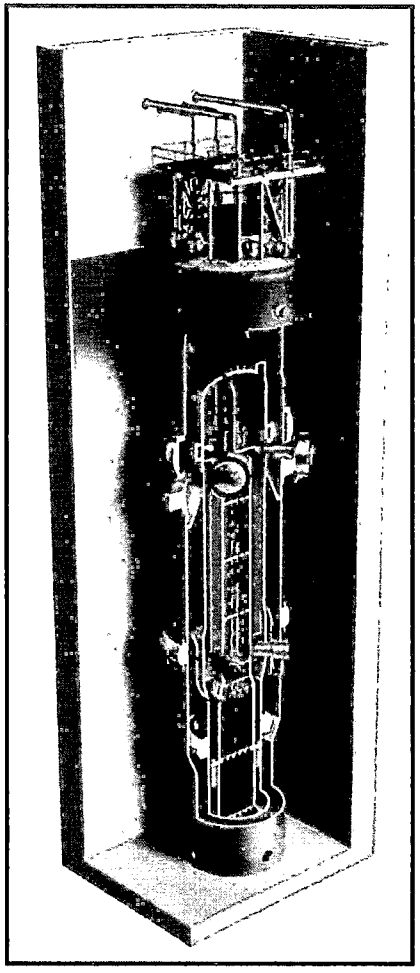
Reactor Vessel Flange Tool (RFT) Design Plan and Schedule



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PM-0219-64475-NP
Revision: 0

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Template #: 0000-21727-F01 R5

RFT Design Plan and Schedule - Agenda

- Discuss RFT Design Plan, and Schedule for Transmittals
- Expected Changes to the NuScale FSAR and Associated Reports
- Proposed COL Item 3.8-5
- Core Plate Motion Generation, and Comparison of In-Structure Response Spectra (ISRS), and
- Scope of Follow-up Analysis
- Description of RFT and RFT Support Models, and Results

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RFT (RAI 8838 and RAI 9225) Closure Schedule

#	Planned Action	Schedule
1	Transmittal of documentation (on docket) providing high-level results from the preliminary Framatome results based on draft (non-QA) core plate motions for RFT and operating bay locations	Feb-12 2019
2	Transmittal of documentation describing planned FSAR and Technical Report mark-ups.	Feb-12 2019
3	Transmittal on the docket of core plate motions (RFT and operating bay) for staff confirmatory analyses	Feb-12 2019
4	Completion of FSAR mark-ups for Chapter 3, per RAI 8838 closure plan.	Mar-8 2019
5	Transmittal of documentation providing high-level results from the full Framatome results based on draft (non-QA) core plate motions	Jul-31 2019
6	Transmittal of mark-ups for RAI 9225	Jul-31 2019

Items 1, 2, and 3 - To be addressed during this meeting.

Item 4 - To be addressed with submittal of NuScale response to RAI 8838

Items 5 and 6 - To be addressed with submittal of NuScale response to RAI 9225

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Scope of FSAR Related Changes

Planned Changes to FSAR Chapter 3 & TR-0916-51502 (RAI 8838)

Update and expand description of the RFT design and analysis (including description of anchor plates, SSC classification, and weight). Add COL Item 3.8-5.

FSAR Impacts:

Section	Section Title	Description of Change
3.8.4.1.15	Reactor Flange Tool	Add COL Item 3.8-5 Revise RFT description for consistency. Add description of anchoring plates, and attachments to these plates.
3.8.4.3.1.12	RFT Weight	Adjust RFT weight to account for current design.
3.8.4.3.2	Liquid Loads	Consistency changes, and clarify the flow of analysis.
3.8.4.5	Structural Acceptance Criteria	Revise RFT acceptance criteria
Table 3.2-1	Classification of Structures, Systems, and Components	Consistency change to match 3.8.4.5 (RFT to B2)
Table 3.8.4-21	RFT Structural Member Demand to Capacity Ratios for SSE	Update Design to Capacity Ratios
Table 3.8.4-22	RFT Embed Plates Demand to Capacity Ratios for SSE	Update Design to Capacity Ratios
Table 3.8.4-23	RFT Structural Member Load Combinations	Define structural member load combinations.
Conforming changes in 9.1, COL Item Table 1.8-2		Conforming changes for RFT description, and new COL Item

TR-0916-51502 "NuScale Power Module Seismic Analysis" Impacts:

Section	Section Title	Description of Potential Change
5.2	Three-Dimensional ANSYS model of Lower NPM and Reactor Flange Tool	Update discussion of the ANSYS model for the RFT design, provide new figures of the 4-armed refueling configuration for seismic analysis
8.4.3	NuScale Power Module Seismic Analysis Results	Update maximum seismic reactions at RPV Upper Supports and Fuel Assembly Supports
Appendix B	Representative In-Structure Response Spectra	Update existing and add new ISRS plots for RFT analysis.

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Scope of FSAR Related Changes

Planned Changes to FSAR Chapter 4 & TR-0816-51127 (RAI 9225)

Expand the discussions of fuel design to include the RFT location, define applicable requirements, and provide conclusions.

FSAR Impacts:

Section	Section Title	Description of Potential Change
4.2.1.5.3	Infrequent Events and Postulated Accidents	Define ASME Service Level for fuel in added RFT location (Service Level D, consistent with 4.2.3.5.1)
4.2.3.5.1	Fuel Assembly Structural Design Evaluation	Add discussion for RFT location, define NPM and RFT locations.
4.2.3.5.9	New Section, addressing RFT Location	Add section to discuss results for RFT location.
Potential conforming changes for 4.2, 4.2.1, 4.2.3, and 4.2.3.5		Conforming changes to account for addition of RFT location, as needed

TR-0816-51127 "NuFuel-HTP2™ Fuel and Control Rod Assembly Designs" Impacts:

Section	Section Title	Description of Potential Change
4.1.1	Stress and Loading Limits	Define ASME Service Level for fuel in added RFT location (Service Level D, consistent with FSAR 4.2.3.5.1)
4.4.4	New Section, addressing RFT Location	Add section to discuss evaluation and results for RFT location.
Potential conforming changes for 1.0, 2.0, 4.0.		Conforming changes to account for addition of RFT location, as needed

TR-0716-50351 "NuScale Applicability of Areva Method for the Evaluation of Fuel Assembly Structural Response to Externally Applied Forces" Impacts:

Section	Section Title	Description of Potential Change
3.0	Review of ANP-10337P Topical Report	Potentially describe RFT location, if required for applicability

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Current Proposed COL Item

COL Item 3.8-5:

A COL applicant that references the NuScale Power Plant design certification will verify that the reactor flange tool (RFT) and embedded plate structures are evaluated using site-specific parameters, and generate input to the reactor pressure vessel and fuel assemblies that are bounded by the certified design.

The design of the structural members will be confirmed by assessing demand-to-capacity ratios for the load combinations in Table 3.8.4-23. The design of the embed plates will be confirmed by assessing demand-to-capacity ratios for the load combinations in Table 3.8.4-1 and Table 3.8.4-2, and applicable design codes in Table 3.8.4-12.

In addition, the core plate motions of the RFT shown in Figures B-34 through B-39 of TR-0916-51502 (NuScale Power Module Seismic Analysis) shall be confirmed against the site-specific values.

If either the demands on the structural members or the embed plates exceed their capacity, or core plate motions are not bounded by the certified design, the COL applicant will design an alternate reactor flange tool and associated embedded plate structures per the criteria specified in FSAR Section 3.8.4, and the fuel assembly-imposed load limitations.

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ISRS Comparisons – Preliminary vs Final Results

- Preliminary core plate time histories have been analyzed by Framatome over the past two months
- The preliminary analysis has given high confidence that margin to limit exists
- Final core plate time histories have now been transmitted to Framatome and the final analysis is underway
- The slides following compare the ISRS of the preliminary (dotted lines) time histories and the final (solid lines) time histories, showing good agreement
- Confidence that margin to limit exists for the fuel when analyzed using the final core plate time histories is high

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Operating Bay – Lower Core Plate

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Operating Bay – Lower Core Plate

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Operating Bay – Upper Core Plate

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Operating Bay – Upper Core Plate

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RFT – Lower Core Plate

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RFT– Lower Core Plate

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RFT – Lower Core Plate

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RFT – Upper Core Plate

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RFT – Upper Core Plate

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RFT – Upper Core Plate

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Scope of Framatome Preliminary Analysis

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Fuel Design Considerations

- FSAR Chapter 4.2, "Fuel System Design"
  - The RFT location will be described
  - Requirements for the RFT location will be identified
  - Evaluations based on the RFT location will be added
  - No changes required for the Operating Bay results
- TR-0816-51127, "NuFuel-HTP2TM and Control Rod Assembly Designs"
  - The RFT location will be described
  - Requirements for the RFT location will be identified
  - The RFT location results will be evaluated, and tables reporting margins to limits will be added
  - The Operating Bay tables reporting margins to limits will be updated
- TR-0716-50351, "NuScale Applicability of AREVA Method for the Evaluation of Fuel Assembly Structural Response to Externally Applied Forces"
  - The applicability of ANP-10337, "PWR Fuel Assembly Structural Response to Externally Applied Dynamic Excitations" to the RFT location will be evaluated

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RFT Support Design

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RFT Support Modeling (Workbench Submodel)

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RFT Support Modeling (Workbench Submodel)

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RFT Modeling

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RFT Structural Member D/C Ratios for SSE

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RFT Wall and Base Embed Plate Design

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Embed Plate D/C Ratios for SSE

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RFT Structural Member Load Combinations

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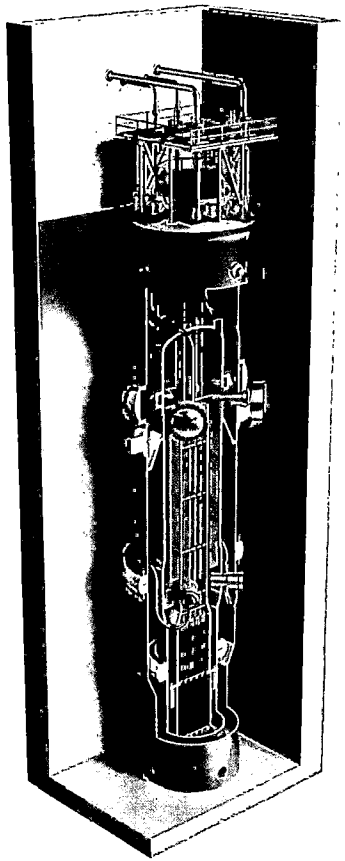

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