Southern Nuclear

Proposed Farley Nuclear Plant
Units 1 & 2 License Amendment Request

Revise Technical Specification 3.6.5
Containment Air Temperature
Actions Upon Exceeding Limit

Presubmittal Meeting: April 3, 2024

Agenda

- Description
- History
- Reason for Change
- Risk-Informed Process for Evaluation (RIPE)
- Technical Evaluation
- Regulatory Evaluation
- Proposed Changes to Tech Specs and Bases
- Discussion

Revise Technical Specification 3.6.5, Containment Air Temperature

DESCRIPTION

- Technical Specification 3.6.5, Containment Air Temperature
  - Actions, Condition A, Containment average air temperature not within limit

- Current Specification
  - LCO – Containment average air temperature shall be ≤ 120°F
  - LCO Note from last summer emergency amendment
    - Containment air temperature shall be ≤ 122°F until 0600 hours on September 9, 2023
  - Action upon exceeding the limit
    - A.1 - Restore containment average air temperature to within limit [within 8 hours]

DESCRIPTION (continued)

- Proposed Specification
  - LCO – Containment average air temperature shall be ≤ 120°F (no change)
  - LCO Note from last summer emergency amendment
    - Remove obsolete Note
  - Action upon exceeding the limit (expand)
    - A.1 – Verify containment average air temperature ≤ 122°F [within 8 hours AND once per 8 hours thereafter]
    - A.2 – Verify by administrative means that containment average air temperature has not exceeded 120°F for > 336 cumulative hours in the current calendar year [within 8 hours AND once per 8 hours thereafter]
    - A.3 – Verify refueling water storage tank temperature ≤ 100°F [within 8 hours AND once per 8 hours thereafter]
    - A.4 - Restore containment air temperature to within limit within 14 days

Revise Technical Specification 3.6.5, Containment Air Temperature

HISTORY

- 2010 NOED
  - Allowed temporary exceedance on August 15
  - Exceedance due to equipment issues lasted ~ 18.5 hours

- 2023 Emergency Amendment (Nos. 247 & 244)
  - Allowed temporary exceedance up to 122°F
  - Compensatory Measures enacted
    - Operate four containment coolers on fast speed with emergency service water aligned
    - Run containment mini-purge continuously
    - Run containment recirculation fans in high speed
    - Work controls are in place to not remove containment cooling system components or supporting systems from service
    - Containment cooling systems are being protected

HISTORY (continued)

- 2019 Farley Amendment (ML19175A243)
  - Adopt Risk-Informed Completion Times (RICT)
  - IAW: NEI-06-09, Rev 0-A
    - Described in license amendment request (ML18208A619, ML19123A253, ML19137A343, and ML19178A390)

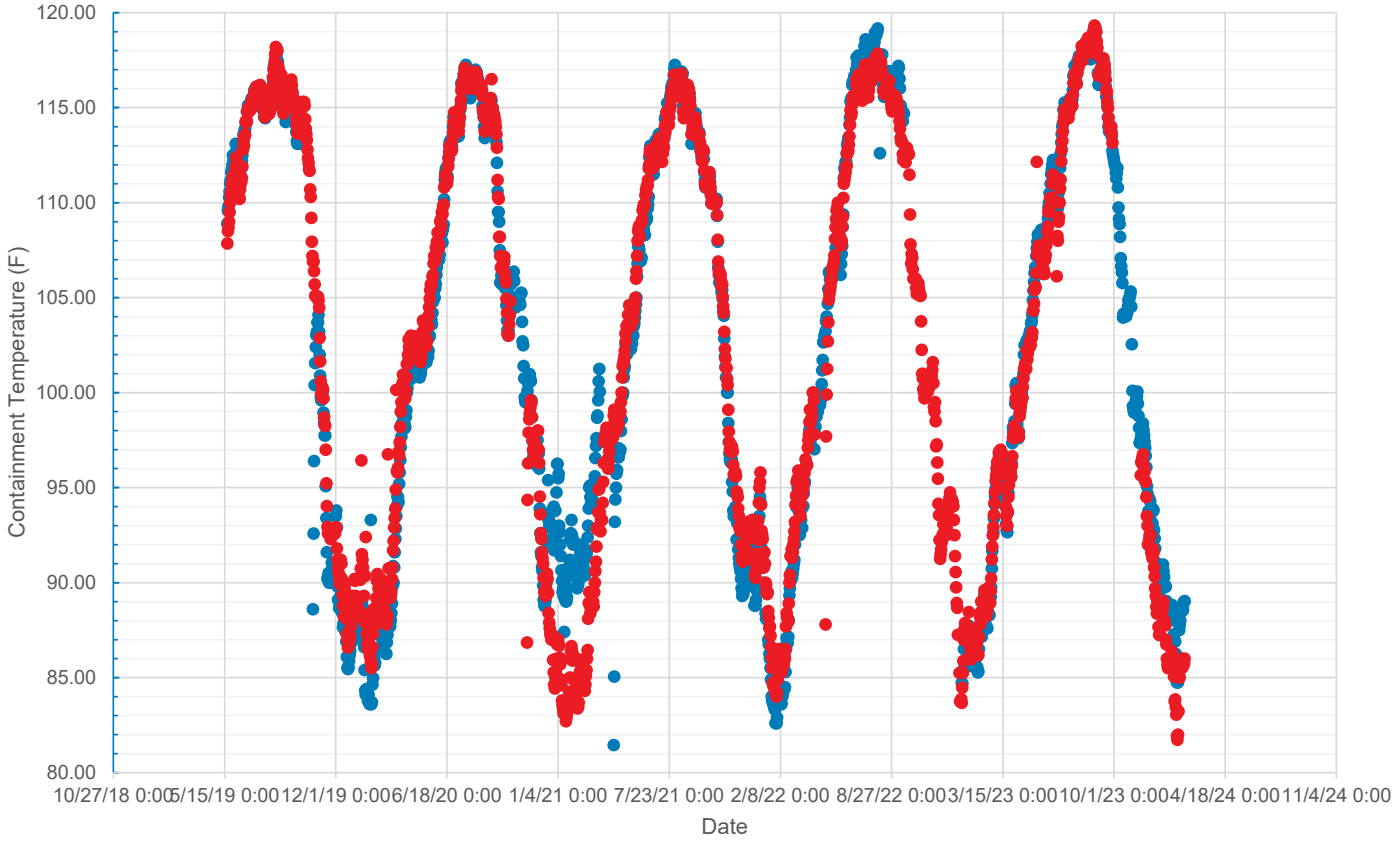
- 2021 Farley Amendment (ML21137A247)
  - Adopt 50.69 categorization process
  - Includes Integrated Decision-Making Panel (IDP)
    - Described in license amendment request (ML20170B114 and ML21064A526)

Revise Technical Specification 3.6.5, Containment Air Temperature

Reason For Change

- Elevated site ambient temperatures experienced during the summer months have driven the containment average air temperature very close to the existing limit of 120°F
- The high ambient temperature conditions are projected to continue during the summer months potentially resulting in both FNP Unit 1 and Unit 2 containment average air temperatures exceeding 120°F
- Summer high temperatures are expected to continue (and possibly worsen)
- High temperature extremes often extend over a 2-week period

Reason For Change (continued)



RISK-INFORMED PROCESS for EVALUATIONS (RIPE)

- Temporary Staff Guidance No. TSG-DORL-2021-01, Rev. 3
  - Risk informed method to dispose of issues of very low safety significance
  - ADAMS ML23122A014
  - RIPE Exemption issued in March of 2022 (ML22054A005)

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Revise Technical Specification 3.6.5, Containment Air Temperature

TECHNICAL EVALUATION (format per Staff Guidance)

- IDP “preliminary evaluation” completed
- PRA applicable / Results identified & acceptable
- Risk Management Actions identified
- Screenings
  - Preliminary (completed) - Some impact
  - Final – Anticipate None “more than minimal”
- Cumulative Risk completed / acceptable
- Performance Monitoring Strategies identified
- Safety Impact concluded as negligible

PRELIMINARY RISK ANALYSIS

- Farley PRA Model Acceptability (peer review, F&Os, recent updates/upgrades)
  - Focus Scoped Peer Review performed Jan. 2023 to review the upgrade to the PRA model.
  - Upgrade consisted of revisions to the Fire PRA model to incorporate updated methods provided in NUREG-2230 and NUREG-2178
- Model Maintenance updates
  - Updates to FLEX modeling
  - Minor logic edits to close out Model Maintenance log items

PRELIMINARY RISK ANALYSIS (continued)

- PRA Scope
  - Containment Temperature is used as a design input for the PRA model and supports an initial condition for Modular Accident Analysis Program (MAAP) analysis that provides inputs to key elements of the PRA model. The hazard scope evaluating the key elements consist of:
    - Internal Events
    - Internal Flooding
    - Fire

PRELIMINARY RISK ANALYSIS (continued)

- PRA Approach
  - MAAP analysis is used as the tool to determine several aspects of the Farley PRA
    - Success Criteria
    - Accident Sequence
    - Human Reliability Analysis – available timing
    - Support in determining the timing & release size to the environment
- The changes in MAAP cases for Containment temp from 120°F to 122°F were compared and evaluations were conducted to determine changes necessary to make in the PRA model.

PRELIMINARY RISK ANALYSIS (continued)

- PRA Approach (continued)
  - Human Failure Events (HFEs) and Success Criteria were the elements affected by an increase in Containment temperature
  - HRA events screened:
    - Any HFEs calculated with the screening method are screened from further analysis.
    - Any HFEs without a supporting MAAP analysis used for timing are screened due to Containment Air Temperature only being an input to MAAP cases.
    - Any HFEs related to steam generator overfill are screened due to the possibility of a steam line break being eliminated.
    - Any HFEs with long time windows and recovery timings (>1 hr) are screened due to those HFEs not being time sensitive enough to impact the success rate of completing those actions.
  - Success Criteria – The success criteria related to containment fan coolers was changed conservatively from 2/4 to 3/4 to evaluate for uncertainty.

PRELIMINARY RISK ANALYSIS (continued)

Summary of 14- day ICCDP/ ΔCDF_{AVE} Contribution

	IE	*IF*	*Fire*	*Seismic*	*Total ICCDP ΔCDF_{AVE}*
Unit 1	0.00E-07	0.00E-07	0.00E-07	0.00E-07	**0.00E-07**
Unit 2	0.00E-07	0.00E-07	0.00E-07	0.00E-07	**0.00E-07**

PRELIMINARY RISK ANALYSIS (continued)

Summary of 14- day ICLERP/ $\Delta LERF_{AVE}$ Contribution

	IE	*IF*	*Fire*	*Seismic*	*Total ICLERP $\Delta LERF_{AVE}$*
Unit 1	0.00E-07	0.00E-07	0.00E-07	0.00E-07	**0.00E-07**
Unit 2	0.00E-07	0.00E-07	0.00E-07	0.00E-07	**0.00E-07**

PRELIMINARY RISK ANALYSIS (continued)

- Sensitivities
  - Most sources of uncertainty for the PRA model have similar effects on the base case as well as the changed case.
  - The uncertainty analysis used for changing the Containment Cooler success criteria from 2/4 to 3/4 showed a negligible impact to CDF and LERF.

SCREENING RESULTS

- Sensitivities
  - Preliminary Screening for No Impact – complete
  - Screening for Adverse Impact – In-progress
  - Screening for More than Minimal Impact – In-progress

SCREENING RESULTS – Question 1

- Initial - Does the issue result in any impact on the frequency of occurrence of an accident initiator or result in a new accident initiator?
  - No – due to the Containment avg air temperature not having an impact on the frequency of an accident initiator or cause
- Comments from Initial IDP Review
  - Provide examples on the basis for accident initiators
  - Clarify wording to ensure extension of completion time vice increase in temperature
  - Confirm answer No
- Final – No impact is “not more than minimal” impact

SCREENING RESULTS – Question 2

- Initial - Does the issue result in any impact on the availability, reliability, or capability of SSCs or personnel relied upon to mitigate a transient, accident, or natural hazard?
  - Yes – due to the increase in avg air temperature potentially affecting the equipment and the ability for operators to react and mitigate an accident due to the increase in avg air temperature in Containment.
- Comments from Initial IDP Review
  - Add discussion regarding the operator actions evaluated
  - Add clarifying information to state that timed critical operation actions (TCOA) were evaluated and no or negligible changes resulted
  - Add more detailed information to support answer
  - Changed answer from No to Yes
- Final – expected answer – “Not more than minimal” impact

SCREENING RESULTS – Question 3

- Initial - Does the issue result in any impact on the radiological dose consequences of an accident sequence?
  - Yes – due to the potential impact of radiological dose consequences of an accident sequence from the potential higher peak Containment temperature and pressure
- Comments from Initial IDP Review
  - Confirmed answer is yes
  - Duplicate defense-in-depth discussion and place in 3
- Final – expected answer – “Not more than minimal” impact

SCREENING RESULTS – Question 4

- Initial - Does the issue result in any impact on the capability of a fission product barrier?
  - Yes – due to the uncertainties of the potential fuel cladding impact
- Comments from Initial IDP Review
  - Provide clarifying and more detailed information to support impact to the fission product barrier.
  - Changed answer from No to Yes
- Final – expected answer – “Not more than minimal” impact

SCREENING RESULTS – Question 5

- Initial - Does the issue result in any impact on the defense-in-depth capability or impact in safety margin?
  - Yes – due to the increase in bulk Containment temperature and potential effect on the accumulator liquid temperature.
- Comments from Initial IDP Review
  - Need to add information about other analyses.
  - Confirmed answer of Yes.
- Final – expected answer – “Not more than minimal” impact

SCREENING RESULTS – Question 5 – D-I-D Discussion

1. Preserve a reasonable balance among the layers of defense
2. Preserve adequate capability of design features without an overreliance on programmatic activities as compensatory measures
3. Preserve system redundancy, independence, and diversity commensurate with the expected frequency and consequences of challenges to the system, including consideration of uncertainty
4. Preserve adequate defense against potential common cause failures
5. Maintain multiple fission product barriers
6. Preserve sufficient defense against human errors
7. Continue to meet the intent of the plant's design criteria

SCREENING RESULTS – Question 5 – Safety Margin Discussion

1. The codes and standards or their alternatives approved for use by the NRC are met; and
2. Safety analysis acceptance criteria in the licensing basis are met or proposed revisions provide sufficient margin to account for uncertainty in the analysis and data

RISK INSIGHTS

Case	CDF-U1	CDF-U2	LERF-U1	LERF-U2
Farley Base	2.69E-06	3.18E-06	1.79E-08	1.94E-08
w/CT Extension	2.69E-06	3.18E-06	1.79E-08	1.94E-08
Delta	0.00E-07	0.00E-07	0.00E-07	0.00E-07
NEI 21-01 Acceptance Guideline	1E-07	1E-07	1E-08	1E-08
NRC RG 1.174 Acceptance Guideline	1E-06	1E-06	1E-07	1E-07

- While not specified as RIPE criteria, the ICCDP is 0.00E-07 and the ICLERP is 0.00E-07 considering 14 days as the total time in the specification annually
- Based on the risk insights, extending TS 3.6.5 is not risk-significant and has a minimal impact on safety.

REGULATORY EVALUATION

- General Design Criterion 4 – *Environmental and dynamic effects design basis*
  - states, in part, that structures, systems, and components important to safety shall be designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including loss-of-coolant accidents.
  - The temporary increase in containment average air temperature by 2°F will have no impact on the qualification status or qualified lives of existing equipment important to safety located in containment in the Environmental Qualification Program scope.
- General Design Criterion 38 – *Containment Heat Removal*
  - requires a system to remove heat from the reactor containment.
  - The change does not impact any containment heat removal functions, and therefore adequately satisfies the requirements of GDC 38.

REGULATORY EVALUATION (continued)

- 10 CFR 50.36(c)(2), Criterion 2 – *Limiting conditions for operation*
  - requires that TSs include LCOs that "are the lowest functional capability or performance levels of equipment required for safe operation of the facility" and include "remedial actions"
  - TS continues to reflect the lowest functional capability required for safe operation and continues to provide appropriate remedial actions including a required plant shutdown if they are not met
- 10 CFR 50.49 – *Environmental qualification of electric equipment important to safety for nuclear power plants*
  - requires, in part, licensees to establish a program for qualifying the electric equipment important to safety
  - The FNP Environmental Qualification Program scope includes electrical equipment that is important to safety and evaluation of any temperature exceedance

REGULATORY EVALUATION (continued)

- Regulatory Guide 1.155 – *Station blackout*
  - Identifies assumptions to address loss of ventilation
  - Identifies that inside containment, loss of ventilation enveloped by the loss of coolant accident (LOCA) and high energy line break (HELB) environmental profiles
- Significant Hazards Consideration
  - No significant hazards identified
- Environmental Consideration
  - Meets the eligibility criteria for categorical exclusion

Proposed Changes to TS 3.6.5

LCO 3.6.5 Containment average air temperature shall be ≤ 120°F.

~~---------- NOTE ----------~~
~~Containment average air temperature shall be ≤ 122ºF until 0600 hours on September 9, 2023~~
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APPLICABILITY: MODES 1, 2, 3, and 4.

Proposed Changes to TS 3.6.5 (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Containment average air temperature not within limit.	A.1 Verify containment average air temperature ≤ 122°F. AND A.2 Verify by administrative means that containment average air temperature has not exceeded 120°F for >336 cumulative hours in the current calendar year.	8 hours AND Once per 8 hours thereafter 8 hours AND Once per 8 hours thereafter

Proposed Changes to TS 3.6.5 (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Containment average air temperature not within limit.	AND A.3 Verify refueling water storage tank temperature ≤ 100°F. AND A.4 Restore containment average air temperature to within limit.	 8 hours AND Once per 8 hours thereafter ~~8 hours~~ 14 days

Related Bases Changes to TS 3.6.5 (for information)

APPLICABLE SAFETY ANALYSES

Short-term exceedance of the containment average air temperature limit has been evaluated and determined to be of minimal impact to safety (Ref. 3).

Containment average air temperature satisfies Criterion 2 of 10 CFR 50.36 (c)(2)(ii).

REFERENCES

3. Amendment Nos. ### and ### for Farley, Units 1 and 2, respectively, dated Month day, year.

Related Bases Changes to TS 3.6.5 (for information) (continued)

ACTIONS

A.1, A.2, A.3 and A.4

When containment average air temperature is not within the limit of the LCO, the containment average air temperature must be verified to be less than or equal to 122°F within 8 hours and once every 8 hours thereafter (Required Action A.1).

With the containment average air temperature less than or equal to 122°F, it must also be verified (within 8 hours and once every 8 hours thereafter) that the containment average air temperature has not exceeded the limit of 120°F for more than 336 cumulative hours (14 days) within the calendar year (Required Action A.2). An evaluation has determined that the small exceedance (less than or equal to 2°F) for this limited cumulative time per summer does not have a significant impact on the cumulative risk.

Required Action A.3 requires verification that the refueling water storage tank temperature is less than or equal to 100°F to support the Containment Spray System and the containment atmosphere cooling function during post-accident conditions.

Related Bases Changes to TS 3.6.5 (for information) (continued)

For Required Actions A.1, A.2, and A.3, the 8 hour Completion Time is reasonable, based on operating experience, to confirm the containment average air temperature and refueling water storage tank temperature and verify they are less than or equal to the identified limit within the Required Action. Additionally, since the ambient air temperature has led to the rising temperatures, verifying the containment average air temperature, the cumulative time above 120°F, and the refueling water storage tank temperature every 8 hours is appropriate to confirm the temperatures remain less than or equal to the identified limit within the Required Action.

Required Action A.4 requires that the containment average air temperature ~~it must~~ be restored to within limit within 14 days ~~8 hours~~. This Required Action is necessary to return operation to within the bounds of the containment analysis. The 14 day ~~8 hour~~ Completion Time is acceptable considering the evaluated risk and the sensitivity of the analysis to variations in this parameter and provides sufficient time to reduce the containment average air temperature to within the limit identified in the LCO, i.e., less than or equal to 120°F. ~~correct minor problems.~~

Revise Technical Specification 3.6.5, Containment Air Temperature

Remaining Actions and Schedule

- NRC Pre-Submittal Meeting 4.03.2024
- Finalize the IDP 4.09.2024
- Submit LAR to NRC 4.25.2024
- Requested Approval by NRC 8.25.2024

Discussion / Feedback