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NL-17-2135

U. S. Nuclear Regulatory Commission
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Joseph M. Farley Nuclear Plant
License Amendment Request to Revise Technical Specification
Section 5.5.17 "Containment Leakage Rate Testing Program"
Response to NRC Request for Additional Information

Ladies and Gentlemen:

On November 15, 2016, Southern Nuclear Operating Company (SNC) submitted a license amendment request (LAR) to revise Joseph M. Farley Nuclear Plant, Unit 1 and Unit 2, Technical Specifications (TS) 5.5.17, "Containment Leakage Rate Testing Program." On March 15, 2017, the Nuclear Regulatory Commission (NRC) staff, upon a determination that additional information was needed to complete its review, issued a request for additional information (RAI) letter. On June 22, 2017, SNC provided a partial response to the NRC's March 15, 2017 letter. On August 3, 2017, the NRC requested supplemental information pertaining to RAI No. 6, 5(b) and 5(c) in an email from Shawn Williams to Ken McElroy. On September 11, 2017, SNC provided a response to the NRC's supplemental request for information pertaining to RAI No. 6 and provided the responses to the remaining RAIs on October 12, 2017. On December 20, 2017, in an email from Shawn Williams to Ken McElroy, the NRC requested supplemental information pertaining to SNC's response to RAI 7 in the October 12, 2017 SNC letter. Enclosed is SNC's response to the December 20, 2017 RAI and a second enclosure that updates the SNC response to RAI No. 7 and the applicable sections of the LAR risk assessment accordingly.

This letter contains no NRC commitments. If you have any questions, please contact Ken McElroy at 205.992.7369.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on February 9th, 2018.

Justin T. Wheat
Nuclear Licensing Manager

jjh/efb/cbg

Enclosures:

1. Response to NRC Request for Additional Information – Supplement to RAI 7
2. Response to NRC Request for Additional Information – Revised RAI 7 Response

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cc: NRC Regional Administrator, Region II
NRC NRR Project Manager – Farley
NRC Senior Resident Inspector – Farley
SNC Records RTYPE: CFA04.054

Joseph M. Farley Nuclear Plant
License Amendment Request to Revise Technical Specification Section 5.5.17
"Containment Leakage Rate Testing Program"
Response to NRC Request for Additional Information

Enclosure 1

Supplement to RAI 7

NRC RAI

Supplement to RAI No. 7

The final CDF and LERF risk values provided in SNC's October 12, 2017, supplement, in response to RAI No. 7, included credit for the Westinghouse Generation III Reactor Coolant Pump (RCP) seals.

Please confirm that the revised values followed the August 23, 2017, Topical Report [TR] PWROG-14001-P, Revision 1, 'PRA Model for the Generation III Westinghouse Shutdown Seal'" and the associated NRC Safety Evaluation including the Limitations and Conditions (ADAMS Package Accession No. ML17200A116). If the Limitations and Conditions in the TR were not followed completely, please identify the exceptions and perform a sensitivity analysis to demonstrate quantitatively that the revised Integrated Leak Rate Test (ILRT) risk metrics remain bounded by the values from the October 12, 2017, supplement, i.e., they do not exceed the previous values.

Or

Propose a licensee condition that would specify compliance with the TR PWROG-14001-P, Revision 1, the NRC Safety Evaluation, and associated Limitations and Conditions. The license condition must include a requirement that the final values for the ILRT risk metrics submitted in the October 12, 2017, supplement, be recalculated and fully compliant with the TR PWROG-14001-P, Revision 1, associated Safety Evaluation and verified to not exceed the ILRT risk metrics submitted in the October 12, 2017, RAI response, prior to extending ILRT from 10 to 15 years.

SNC Response to Supplement to RAI 7:

With the exception of Conditions 2 and 4, SNC's CDF and LERF risk values in the October 12, 2017 supplemental response comply with the August 23, 2017, Topical Report (TR) PWROG-14001-P, Revision 1, "PRA Model for the Generation III Westinghouse Shutdown Seal" and the associated NRC Safety Evaluation (SE) including the Section 5 Limitations and Conditions. [Proprietary information contained in Conditions 2 and 4 have been purposefully omitted from this discussion.] Subsequent to the October 12, 2017 response, Conditions 2 and 4 were incorporated into the Fire PRA models as part of the refinement of the Fire PRA models for NFPA 805. The Internal Events PRA models have also been revised since the October 12 submittal and include Condition 2, but do not yet include Condition 4. However, based on a sensitivity performed using these latest Internal Events models, Condition 4 results in an increase in CDF of only 0.07 percent and an increase in LERF of only 0.01 percent. In addition to the revisions of the Internal Events and Fire PRA models since the October 12, 2017 RAI response, SNC has corrected an error in the exponent of the Seismic LERF value reported in the RAI response on October 12, 2017.

Also, in response to a follow-on NRC reviewer question, the ILRT interval extension risk assessment values reported in the LAR (e.g. population dose increase and increase in conditional containment failure probability) were re-calculated using the latest revision of the

Enclosure 1 to NL-17-2135
SNC Response to NRC RAIs

Internal Events model which includes Condition 2, and modified to incorporate Condition 4 to show that the final results remain in the acceptable range.

Accordingly, In Enclosure 2, SNC has updated the response to RAI #7 which includes a recalculated Table 6-2 that reflects the CDF and LERF values from the latest Internal Events and Fire PRA models, which were revised after the October 12, 2017 RAI response.

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“Containment Leakage Rate Testing Program”
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Enclosure 2

Revised RAI 7 Response

NRC RAI 7

In Section 6.3, "Potential Impact from External Events Contribution," Table 6-2 provides CDF and LERF values for Seismic Events from the FNP FPPA. As cited in the SE for NFPA 805 transition (ADAMS Accession No. ML 14308A048), Farley used an average of the CDF values ($1.73\text{E-}5/\text{yr}$ per unit) from the "Safety/Risk Assessment Results for GI-199," (ADAMS Accession No. ML 100270582).

NRC Staff results show that if using $1.73\text{E-}5/\text{yr}$ per unit, the CDF totals on Table 6-2 would calculate to $1.03\text{E-}4/\text{yr}$ and $1.08\text{E-}4/\text{yr}$, respectively. Both would minimally exceed the RG 1.174 Region II threshold of $1.00\text{E-}4/\text{yr}$. The NRC Staff notes that an increase in each LERF would also occur based on the seismic LERFs of $2.02\text{E-}7/\text{yr}$ and $2.60\text{E-}7/\text{yr}$ for Units 1 and 2, respectively, as cited in the NFPA 805 SE.

- 1) Perform a complete recalculation of Table 6-2 and subsequent calculations in Sections 6 and 7 using the values cited in the NFPA-805 SE and address all the issues identified in the preceding RAIs (RAI No. 1, 3, 5, and 6).*
- 2) Confirm that any increase in the risk metrics as a result of the recalculation in part 1) above does not change the justification for exceeding the acceptance criteria for this application.*

With respect to Table 6-2, the application stated, "the value for Total Internal and External events CDF slightly exceeds a value of $1.0\text{E-}04/\text{yr}$ ". This value is expected to fall below $1.0\text{E-}04/\text{yr}$ when the Farley Internal Events PRAs for Unit 1 and Unit 2 credit the Generation III RCP shutdown seals which are already installed. Crediting the Generation III RCP seals is expected to reduce Internal Events CDF to the mid- $1.0\text{E-}06/\text{yr}$ range on both units."

Justify the expectation of a reduction in internal events CDF after crediting the Generation III RCP seals to the mid- $1.0\text{E-}6/\text{yr}$ range on both units by using a bounding quantification.

SNC RAI 7 Response

The following provides an update to the October 12, 2017 RAI 7 response that replaced the original LAR submittal sections 6 and 7 including a recalculation of Table 6-2. Aside from the new Fire PRA values provided in Table 6-2 below, answers to preceding RAIs are not affected by this response.

Submittal Section 6.3 Potential Impact from External Events Contribution

Table 6-2 lists the Farley CDF and LERF values for each internal and external event type that are used to determine the potential impact from the External Events contribution.

- The values for the internal events PRA represent the average of Train A and Train B CDF/LERF results for each unit. Results come from the quantification of a modified version of SNC Calculation PRA-BCF-18-002, Revision 1, Farley FPIE Asymmetric Cooling Provisional Update (Reference 1). This modified version incorporates additional recommended model changes from Reference 3, Reference 4, and Reference 8.

- The values for the Fire PRA come from Farley Fire PRA F-RIE-FIREPRA-U00-014 (Reference 2).
- The values for Seismic come from PRA-BC-F-17-002, Seismic Risk Evaluation based on IPEEE and EPRI 2014 Farley Seismic Hazard (Reference 5).
- The values for Loss of SW Dam come from F-RIR-ILRT-U00-002, Farley Nuclear Plant Service Pond Dam Failure Evaluation (Reference 6).
- The values for Other External Risk come from SNC letter to NRC, NL-13-1503 (Reference 7).

Table 6-2: Farley Internal and External Events Summary				
Event Type	Farley Unit 1		Farley Unit 2	
	CDF (per/year)	LERF (per/year)	CDF (per/year)	LERF (per/year)
Internal Events	8.90E-06	9.76E-08	8.76E-06	7.93E-08
Loss of SW Dam	3.49E-07	4.53E-09	3.49E-07	4.53E-09
Fire Events	8.35E-05	4.21E-06	7.89E-05	4.51E-06
Seismic	4.51E-06	2.07E-06	4.51E-06	2.07E-06
Other External Risk	Screened out			
Total	9.73E-05	6.38E-06	9.25E-05	6.66E-06

Combining the External Events CDF values and the Internal Events CDF yields a CDF estimate of 9.73E-05/yr (Unit 1) and 9.25E-05/yr (Unit 2). LERF estimates including External Events are 6.38E-06/yr (Unit 1) and 6.66E-06/yr (Unit 2). The value for Total Internal and External Events CDF does not exceed a value of 1.0E-04.

The change in LERF from extending the Type A test interval can be conservatively estimated using the total CDF values to determine the external event contribution. These CDF values were specifically used to determine the Class 3b frequency (neglecting corrosion¹) including the external events contribution. The factors for determining the increase in the non-detection probability of a leak described in Section 4.3 (of the LAR) were applied to the Class 3b base value frequencies to determine the 3b frequencies for the once per ten year test and once per fifteen year test for each unit.

Class 3b Frequency (three per ten year test) = $0.0023 * (\text{CDF} - \text{LERF})$
Class 3b Frequency (Unit 1) = $0.0023 * (9.73\text{E-}05/\text{yr} - 6.38\text{E-}06/\text{yr}) = 2.09\text{E-}07/\text{yr}$
Class 3b Frequency (Unit 1) (once per ten year test) = $3.33 * 2.09\text{E-}07/\text{yr} = 6.96\text{E-}07/\text{yr}$
Class 3b Frequency (Unit 1) (once per fifteen year test) = $5.00 * 2.09\text{E-}07/\text{yr} = 1.05\text{E-}06/\text{yr}$
Class 3b Frequency (Unit 2) = $0.0023 * (9.25\text{E-}05/\text{yr} - 6.66\text{E-}06/\text{yr}) = 1.97\text{E-}07/\text{yr}$
Class 3b Frequency (Unit 2) (once per ten year test) = $3.33 * 1.97\text{E-}07/\text{yr} = 6.58\text{E-}07/\text{yr}$
Class 3b Frequency (Unit 2) (once per fifteen year test) = $5.00 * 1.97\text{E-}07/\text{yr} = 9.87\text{E-}07/\text{yr}$

Table 6-3 shows the results of these calculations. Note that in the above calculation Class 3b releases are considered to arise from a change in state of prior non-LERF states to a LERF (Class 3b) state. The Internal Events Contribution to Class 3b releases are calculated utilizing the same equation multipliers above.

¹ Corrosion effects are not explicitly considered in the sensitivity assessment as the impact is negligible.

Table 6-3: Farley Estimated Total LERF Including External Events Impact				
Case	3b Frequency (3 per 10 year test)	3b Frequency (1 per 10 year test)	3b Frequency (1 per 15 year test)	LERF Increase (3 per 10 year test to 1 per 15 year)
Unit 1 Internal Events Contribution	2.03E-08	6.74E-08	1.01E-07	8.10E-08
Unit 1 Total Contribution including External Events	2.09E-07	6.96E-07	1.05E-06	8.36E-07
Unit 2 Internal Events Contribution	2.00E-08	6.65E-08	9.98E-08	7.99E-08
Unit 2 Total Contribution including External Events	1.97E-07	6.58E-07	9.87E-07	7.90E-07

Using the above approach the calculated increase in LERF including External Events resulting from a change in the Type A ILRT test interval from the three per ten year test frequency to the once per fifteen year test frequency is 8.36E-07/yr for Unit 1 and 7.90E-07/yr for Unit 2. The corresponding LERF (Class 3b Frequency) for a permanent once per 15 year ILRT program is 1.05E-06/yr for Unit 1 and 9.87E-07/yr for Unit 2.

Submittal Section 7: Conclusions

Based on the results from Section 5 and the sensitivity calculations presented in Section 6, the following conclusions regarding the assessment of the plant risk are associated with permanently extending the Type A ILRT test frequency to once in fifteen years:

- Regulatory Guide 1.174 provides acceptance criteria for increase in CDF and LERF resulting from a risk-informed application. Since the ILRT does not impact CDF, the relevant criterion for this application is LERF. When the calculated increase in LERF is "very small", which is taken as being less than 10^{-7} per reactor-year, the change will be generally considered acceptable irrespective of the plant's LERF value. When the calculated increase in LERF is in the range of 10^{-7} per reactor-year to 10^{-6} per reactor-year, the applications will be considered acceptable only if the total plant LERF is less than 10^{-5} per reactor-year.
- From Table 6-3, the increase in LERF based on the internal events PRA, resulting from a change in the Type A ILRT test interval from three in ten years to one in fifteen years, is conservatively estimated as 8.10E-08/yr for Unit 1 and 7.99E-08/yr for Unit 2, using the EPRI guidance as written. These estimated changes in LERF for Farley Unit 1 and

Unit 2 are “very small” and therefore determined to be within the acceptance guidelines of Reg. Guide 1.174.

- From Table 6-3, the increase in LERF based on the inclusion of external events impacts, resulting from a change in the Type A ILRT test interval from three in ten years to one in fifteen years, is conservatively estimated as $8.36\text{E-}07/\text{yr}$ for Unit 1 and $7.90\text{E-}07/\text{yr}$ for Unit 2, with the corresponding LERF (3b Frequency) of $1.05\text{E-}06/\text{yr}$ for Unit 1 and $9.87\text{E-}07/\text{yr}$ for Unit 2, using the EPRI guidance as written. These estimated changes in LERF for Farley Unit 1 and Unit 2 are “small” and determined to be within the RG 1.174 acceptance criteria for Region II. In addition, from Table 6-2, the total LERF based on the inclusion of external events impacts is $6.38\text{E-}06/\text{yr}$ for Unit 1 and $6.66\text{E-}06/\text{yr}$ for Unit 2, which remains less than the Regulatory Guide 1.174 acceptance guideline of 10-5 per year.
- According to the Regulatory Guide 1.174 even though the proposed changes to ILRT do not change the CDF values, no changes would be permitted per this Regulatory Guide if the plant CDF exceeds 10^{-4} per year. For the sensitivity case of the examination of the impact of external events, the calculated CDF, with the external events included, does not exceed this value for either unit.
- The change in Type A test frequency to once per fifteen years, measured as an increase to the total integrated plant risk for those accident sequences influenced by Type A testing, based on the internal events PRA is $5.02\text{E-}03$ person-rem/yr for Unit 1 and $4.94\text{E-}03$ person-rem/yr for Unit 2. EPRI Report No. 1009325, Revision 2-A states that a very small population dose is defined as an increase of ≤ 1.0 person-rem per year or $\leq 1\%$ of the total population dose, whichever is less restrictive for the risk impact assessment of the extended ILRT intervals. This is consistent with the NRC Final Safety Evaluation for NEI 94-01 and EPRI Report No. 1009325. Moreover, the risk impact when compared to other severe accident risks is negligible.
- The increase in the conditional containment failure probability from the three in ten year interval to a permanent one time in fifteen year interval is 0.91% for Unit 1 and 0.92% for Unit 2. EPRI Report No. 1009325, Revision 2-A states that increases in CCFP of ≤ 1.5 percentage points is very small. This is consistent with the NRC Final Safety Evaluation for NEI 94-01 and EPRI Report No. 1009325. Therefore this increase is judged to be very small.

Therefore, permanently increasing the ILRT interval to fifteen years is considered to be a small change to the Farley Unit 1 and Unit 2 risk profile.

RAI 7 References

1. SNC Calculation PRA-BC-F-18-002, “Farley FPIE Asymmetric Cooling Provisional Update,” Revision 1.
2. F-RIE-FIREPRA-U00-014, “Farley Fire PRA Summary Report,” Revision 1.
3. LTR-RAM-15-77, “Farley Units 1 and 2 Inputs Used for the Integrated Leak Rate Test Interval Extension Analysis,” Revision 0-C, March 2016.
4. LTR-AMER-MKG-17-1406, “Westinghouse Offer for Farley Units 1 and 2 Request for Additional Information (RAI) Support Regarding Level 2 PRA Model Updates for the Integrated Leak Rate Test (ILRT) Extension,” Appendix B, September 2017.
5. PRA-BC-F-17-002, “Seismic Risk Evaluation based on IPEEE and EPRI 2014 Farley Seismic Hazard,” Revision 1.

6. F-RIR-ILRT-U00-002, "Farley Nuclear Plant Service Pond Dam Failure Evaluation," Revision 1
7. SNC letter to NRC, NL-13-1503, "Joseph M. Farley Nuclear Plant - Response to Request for Additional Information Regarding License Amendment Request for Transition to 10 CFR 50.48(c) – NFPA 805 Performance Based Standard for Fire Protection for Light Water Reactor Generating Plants," Revision 1.
8. SNC memorandum RBA-18-001-F, "Risk-Based Analysis: RBA-18-001-F; Risk Evaluation - SDS Bypass Failure Mode of RCP Model 93A," January 2017.