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Enclosure 3 contains security-related information not for public disclosure. Withhold per 10 CFR 2.390.

SOUTHERN NUCLEAR
A SOUTHERN COMPANY

July 25, 2016

Docket Nos.: 50-348
50-364

NL-16-0784

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555-0001

Farley Nuclear Plant – Units 1 and 2
Response to Request for Additional Information for TSTF-312

Ladies and Gentlemen:

By letter dated November 24, 2014, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14335A623) Southern Nuclear Operating Company (SNC) submitted a license amendment request (LAR) to adopt various previously approved Technical Specifications Task Force (TSTF) Travelers and two changes not associated with Travelers for Joseph M. Farley Nuclear Plant (Farley), Units 1 and 2. The U.S. Nuclear Regulatory Commission (NRC) issued a request for additional information (RAI) on December 30, 2015 (ADAMS Accession No. ML 15363A265). SNC provided its response on March 3, 2016 (ADAMS Accession No. ML 16063A516).

On May 3, 2016, the NRC staff conducted an audit of the design for Farley and the bounding analysis used to support the proposed LAR in accordance with the audit plan. During the audit, it was determined that additional information is needed.

By letter dated May 17, 2016, the NRC sent SNC an additional RAI related to TSTF-312-A (ADAMS Accession No. ML16125A411.) Enclosure 1 to this letter provides SNC's response to the NRC RAI.

Enclosure 2 of this RAI response contains pertinent parts of Farley's Fuel Handling Accident (FHA) calculation used in answering this RAI. Enclosure 3 contains relevant supplemental drawings. The drawings contain security-related information and should be withheld from public disclosure under 10 CFR 2.390. The cover letter, Enclosure 1 and Enclosure 2 may be processed normally and made publicly available.

This letter contains no new NRC commitments. If you have any questions, please contact Ken McElroy at (205) 992-7369.

A001
NRR

Mr. C. R. Pierce states he is Regulatory Affairs Director of Southern Nuclear Operating Company, is authorized to execute this oath on behalf of Southern Nuclear Operating Company and, to the best of his knowledge and belief, the facts set forth in this letter are true.

Respectfully submitted,

C. R. Pierce

C. R. Pierce
Regulatory Affairs Director

CRP/JMC/lac

Sworn to and subscribed before me this 25th *day of* July *, 2016.*

Notary Public

My commission expires: 1/2/2018

Enclosures:
1. Response to RAI for TSTF-312
2. Excerpts from Calculation SM-96-1064-001
3. Supplemental Drawings – CD Format

cc: Southern Nuclear Operating Company
Mr. S. E. Kuczynski, Chairman, President & CEO
Mr. D. G. Bost, Executive Vice President & Chief Nuclear Officer
Mr. D. R. Madison, Vice President – Fleet Operations
Mr. M. D. Meier, Vice President – Regulatory Affairs
Ms. C. A. Gayheart, Vice President – Farley
Mr. B. J. Adams, Vice President – Engineering
Ms. B. L. Taylor, Regulatory Affairs Manager – Farley
RType: Farley=CFA04.054

U. S. Nuclear Regulatory Commission
Ms. C. Haney, Regional Administrator
Mr. S. A. Williams, NRR Project Manager - Farley
Mr. P. K. Niebaum, Senior Resident Inspector - Farley

Alabama Department of Public Health
Dr. Thomas M. Miller, MD, State Health Officer

Farley Nuclear Plant – Units 1 and 2
Response to Request for Additional Information for TSTF-312

Enclosure 1

Response to RAI for TSTF-312

By letter dated November 24, 2014, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14335A623) Southern Nuclear Operating Company (SNC) submitted a license amendment request (LAR) to adopt various previously approved Technical Specifications Task Force (TSTF) Travelers and two changes not associated with Travelers for Joseph M. Farley Nuclear Plant (Farley), Units 1 and 2. The U.S. Nuclear Regulatory Commission (NRC) issued a request for additional information (RAI) on December 30, 2015 (ADAMS Accession No. ML 15363A265). SNC provided its response on March 3, 2016 (ADAMS Accession No. ML 16063A516).

By letter dated May 17, 2016, the NRC sent SNC an additional RAI related to TSTF-312-A (ADAMS Accession No. ML16125A411.) The enclosure to this letter provides SNC's response to the NRC RAI.

Request For Additional Information No. 1:

Following a fuel handling accident (FHA), there exists a potential for activity to migrate from open containment penetrations into adjacent buildings and eventually into the control room. Please provide additional information describing how this potential contribution to control room dose is accounted for, in, or bounded by, the FHA dose consequence analysis of record.

SNC Response to RAI No. 1:

SNC submitted its LAR implementing TSTF-312 upon the basis that the existing FHA dose analysis bounds any reasonable activity release scenario associated with open containment penetrations as allowed by the TSTF. Qualitatively, this conclusion with respect to control room dose was drawn because release through the open personnel airlock (which routes into the auxiliary building at the control room elevation) will maximize radioactive effluent transport to the control room (i.e., when compared to a release through one or more relatively small penetrations into lower elevations of the auxiliary building). Following additional review and analysis as described below, SNC has confirmed that the existing analysis doses remain bounding.

Assertion #1:
Any build-up of radioactivity around the Main Control Room (MCR) as released from open containment penetrations would be small and take time to accumulate - based on size and locations of penetrations, driving mechanisms for activity transport, etc. By comparison, a release through the open personnel airlock would bound any radioactivity buildup from open containment penetrations.

Basis for Assertion #1:
The penetrations that are part of this License Amendment Request are located in rooms surrounding containment. With the exception of the main steam and containment purge penetrations, these rooms are all located on building floors below the MCR. Please see the attached drawings, D176003 through D176006 and D206003 through D206006, for the general arrangement of the rooms in the auxiliary building.

During an FHA in containment (assuming the safety related penetration room filtration system (PRFS) is not operating), any activity released would first pass into the penetration room, mix in that volume, and then flow through the doors into the rest of the auxiliary building on that floor. The doors to the stairwells are generally closed, though not airtight. Radioactive effluent would have to seep under the doors, into the stairwell, out the upper floor stairwell door, and then follow a tortuous path through the building on the 155' elevation to gather in the spaces on either side of the control room at the airtight doors (Mark numbers 418, 453, and 2480 – see drawings D176006, D176069, and D206006). The walls, floors, and ceilings of the MCR are sealed airtight. This includes the floor penetrations to the cable spreading room beneath the control room (see Drawings D176068, D176069, D176070, D206068, D206069, and D206070).

It is noted that the lower floors of the Auxiliary Building are ventilated, but this does not create a mechanism for transport of radioactive effluent to the control room. The discharge ducts of the ventilation systems do not run in the rooms just outside the control room envelope. Discharge from the ventilation system does occur through the plant vent above the Auxiliary Building roof, but not on the same side of the control room as the intakes for the control room emergency filtration system (CREFS).

Assertion #2:
Build-up of radioactivity around the MCR does not create a realistic mechanism for infiltration of radioactivity into the control room. Consistent with this, the bounding FHA dose AOR assumes unfiltered in-leakage to the control room enters from MCR HVAC.

Basis for Assertion #2:
The MCR is a dual unit facility, meaning that at least one train of safety related heating ventilation and air conditioning (HVAC) is operational at all times. Under those conditions, the MCR is at a higher pressure than the areas around it. In addition, should radiation be detected in the intake ductwork, the MCR HVAC system (CRACS) enters isolation mode, sealing the MCR from outside air. In the FHA, the operators take manual action to initiate the pressurization mode. Once the MCR is pressurized, outside air cannot seep into the MCR.

The Control Room Integrity Program (CRIP) is described in Section 5.5.18 of the Farley FSAR. Allowable unfiltered in-leakage rates for the MCR are described in the program. These allowable leakage rates are modelled in the FHA AOR. SNC conducts surveillances in accordance with the CRIP to assure that the control room is at a higher pressure than the areas around it, and to assure that MCR unfiltered in-leakage is within the limits described in the CRIP. In the first quarter of 2016, SNC completed a surveillance of the MCR unfiltered in-leakage showing that all the conditions of the CRIP were met. That surveillance also included testing of the pressure differential between the control room and the surrounding areas. Again, surveillance requirements were met.

Assertion #3:
Even in the bounding scenario of a FHA with the personnel airlock (PAL) open, instantaneous transport of radioactivity through the auxiliary building to the nearest MCR door, 10 CFM of unfiltered in-leakage through the door (associated

with ingress/egress as described in Standard Review Plan Section 6.4) and with the Technical Specification allowable unfiltered in-leakage through the MCR HVAC), the total dose to the control room would be less than the bounding AOR dose.

Basis for Assertion #3:
The SNC bounding AOR dose calculation assumes the PAL open and 450 CFM (plus 10 CFM ingress/egress) of unfiltered in-leakage through the MCR CREFS (in pressurization mode). Other conservatisms are included in the analysis such as: neglecting the effect of the CREFS recirculation filters. In this case, MCR dose values were found to be acceptable, with the limiting dose of consequence being a Thyroid Dose of 39.6 REM.

In response to this RAI, SNC has performed an additional analysis that has been appended to the FHA AOR. This analysis modeled 43 CFM of unfiltered in-leakage from the MCR HVAC, consistent with the Technical Specification allowable in-leakage (and as confirmed in recent surveillance results). Additionally, the analysis modeled 10 CFM of unfiltered in-leakage as conservatively transported through the PAL, into the auxiliary building, and to the nearest MCR door. This supplemental analysis resulted in acceptable MCR dose values, with the limiting dose of consequence being a Thyroid Dose of 12.3 REM.

While details of the analysis performed follows, the key conclusion is that the worst MCR dose from the existing FHA AOR clearly bounds scenarios allowed by the plant Technical Specifications, before and after implementation of TSTF-312.

Supplemental Analysis Details
That bounding case from the AOR models the release of radioactivity through two pathways, the containment equipment hatch (a 19.75 foot diameter hole per drawing D176415) and PAL(a 9.72 foot diameter hole). The PAL is on the same elevation as the MCR (see D176006 and D206006 for Units 1 & 2, respectively). Radioactivity released from containment in a FHA would enter the hall way and disperse in a large volume of air on the floor at the 155' elevation. The path from the PAL to the MCR doors is a tortuous one. The pathway from the Unit 1 airlock to the Unit 1 MCR door is the shortest: approximately 188 feet long, and the flow must make three 90° turns and must pass through three normally closed doors (mark numbers 412, 487, and 488, see D176006).

If the selective assumptions are made that the doors along the shortest flow path are open so that they do not restrict flow and that other non-airtight but potentially closed doors will prevent mixing, the rooms in Table 1 will act as the mixing volume and will become contaminated:

Table 1: Aux Building Mixing Volume

ROOM	Floor Area (ft^2)	Room Height (ft)	Volume (ft^3)
409	1958	18	35244
402	213	18	3834
419	1203	18	21654
408	1483	18	26694
405	1181	18	21258

Table 1: Aux Building Mixing Volume

ROOM	Floor Area (ft^2)	Room Height (ft)	Volume (ft^3)
422	316	18	5688
423	344	18	6192
410-A	271	18	4878
410-B	146	18	2628
417	243	18	4374
415	217	18	3906
483	595	18	10710
432	354	18	6372
446	780	18	14040
454	251	18	4518
429	2144	18	38592
Total	**11699**	**18**	**210582**

The total volume in which the activity will mix is therefore 210582 cubic feet.

Further, if we assume that only 50% can be used in keeping with the logic presented for containment in RG-1.195, then the volume is 105291 cubic feet. Converting this to cubic meters, the allowable mixing volume is 2983 m^3.

If we assume no appreciable delay in mixing (for convenience 1 second), the dilution factor is then (1/2983 s/m^3) = 3.35E-04 s/m^3.

At this point it is important to look at the X/Q dispersion factors used in the AOR:

Table 2: X/Q for MCR intakes

Time Start (hr)	Time End (hr)	Dispersion Factor s/m^3
0.000	0.0125	5.06E-03
0.0125	0.1667	1.66E-03
0.1667	2.0000	1.66E-03
2.0000	8.0000	1.38E-03
8.0000	720.0000	7.20E-04

Comparing the dilution factor to the dispersion factor shows that the treatment of the PAL release as dispersed to the MCR HVAC intakes was conservative, from a factor of 3 to 12 during the first 8 hours after the accident. Taking the radioactivity, dispersing it from the plant vent, and drawing the 10 CFM through the CREFS system unfiltered, is actually more conservative than bringing 10 CFM through the MCR door after mixing in the rooms on the same floor as the MCR.

Using the methodology of the AOR (pages 29 to 34), a direct transfer from the containment to the control room for the iodine isotopes can be simulated:

Table 3: Direct Transfer of Iodine Isotopes for AOR Bounding Case

TIME (Hr)	RELEASE FLOW (CFM)	X/Q (s/m^3)	Conversion Factors ($m\text{-}m^3/sec\text{-}ft^3$)	INTAKE FLOW (CFM)	Direct. Transfer Intake Flow (CFM)	Thyroid Dose (REM)	REM/ CFM
0 – 0.0125	53500	5.06E-03	4.72E-04	2350	300.4	0.1878	6.25E-04
0.0125 – 0.167	53500	1.66E-03	4.72E-04	610	25.58	5.4839	2.14E-01
0.167 – 2.000	53500	1.66E-03	4.72E-04	910	38.16	32.4466	8.50E-01
2.000 – 8.000	53500	1.38E-03	4.72E-04	910	31.72	1.4692	4.63E-02

The AOR bounding case thus yields an integrated Thyroid Dose of 39.6 REM.

The key result is the REM/CFM intake in the last column. Using that same dose relationship for the 10 CFM intake from the MCR door:

Table 4: Direct Transfer of Iodine Isotopes for Ingress/Egress Contribution

TIME (Hr)	RELEASE FLOW (CFM)	DILUTION FACTOR (s/m^3)	Conversion Factors ($m\text{-}m^3/sec\text{-}ft^3$)	INTAKE FLOW (CFM)	Direct. Transfer Intake Flow (CFM)	REM/ CFM	Thyroid Dose (REM)
0.000 – 0.0125	2350	3.35E-04	4.72E-04	10	3.72E-03	6.25E-04	2.33E-06
0.0125 – 0.167	2350	3.35E-04	4.72E-04	10	3.72E-03	2.14E-01	7.98E-04
0.167 – 2.000	2350	3.35E-04	4.72E-04	10	3.72E-03	8.50E-01	3.16E-03
2.000 – 8.000	2350	3.35E-04	4.72E-04	10	3.72E-03	4.63E-02	1.72E-04

This yields an integrated Thyroid Dose contribution of 0.0041 REM (4.1 mRem).

What remains to be considered is the reduction in Thyroid dose to the operators if the assumed unfiltered in-leakage is reduced from 460 CFM (as in the current AOR) to 43 CFM (as allowed by the CRIP). Inherent in the evaluation is that the 10 CFM ingress/egress unfiltered in-leakage does not come through the CREFS source, even during the time before the pressurization mode is activated.

SNC re-evaluated the thyroid dose using the same methods as shown on pages 29 to 34 of the AOR, accounting for the reduction in unfiltered in-leakage.

Table 5: Direct Transfer of Iodine Isotopes for Reduced In-Leakage

TIME (Hr)	RELEASE FLOW (CFM)	X/Q (s/m^3)	Conversion Factors ($m\text{-}m^3/sec\text{-}ft^3$)	INTAKE FLOW (CFM)	Direct. Transfer Intake Flow (CFM)	Effective Filter Efficiency (%)
0.000 – 0.0125	53500	5.06E-03	4.72E-04	2340	299.08	0
0.0125 – 0.167	53500	1.66E-03	4.72E-04	600	25.16	0
0.167 – 2.000	53500	1.66E-03	4.72E-04	493	20.67	89.91
2.000 – 8.000	53500	1.38E-03	4.72E-04	493	17.19	89.91

The change in direct transfer flows and the changes in effective filter efficiency once the pressurization mode starts have a significant impact on the curies of iodine inhaled and on the resultant thyroid doses.

Table 6: Integrated Thyroid Dose Results for Revised Case

Isotope	Curies Inhaled by Time Period (Hr)					Integrated Thyroid Dose
	0 – 0.0125	0.0125 – 0.167	0.167 – 2	2 – 8	0 – 8	
I 131	1.68E-07	4.85E-06	5.74E-06	2.60E-07	1.10E-05	1.21E+01
I 132	2.60E-20	7.29E-19	7.33E-19	1.94E-20	1.51E-18	9.49E-15
I 133	1.16E-08	3.34E-07	3.89E-07	1.67E-08	7.51E-07	1.35E-01
I 135	1.00E-11	2.86E-10	3.20E-10	2.28E-11	6.38E-10	1.98E-05

The results were as expected: MCR Thyroid Dose was reduced from the AOR value of 39.6 Rem to 12.3 REM. As such, the existing AOR case remains bounding as the basis for demonstrating acceptable MCR dose during an FHA. The evaluation above has been added to the AOR as a supplemental case to demonstrate conservatism of the bounding case.

Request For Additional Information No. 2:

SNC states in its application that, "The proposed TS change adds a Note to the LCO for Specification 3.9.4, 'Containment Penetrations,' allowing Penetration flow path(s) that have direct access from the containment atmosphere to the outside containment atmosphere to be unisolated under administrative control." Please provide confirmation that the subject administrative controls will be defined in a document that is subject to the requirements of Title 10 of the *Code of Federal Regulations*, Section 50.59, "Changes, test and experiments."

SNC Response to RAI No. 2:

All procedure changes at SNC plants are subject to an Applicability Determination screening per a fleet procedure, NMP-AD-008.

Applicability Determination is the process for determining if a proposed activity (design, procedure, and licensing document changes) can be excluded from the scope of 10 CFR 50.59. Such action is allowed by 10 CFR 50.59(c)(4) which states that the provisions of 10 CFR 50.59 do not apply to changes to the facility or procedures when an activity is controlled by another more specific regulation.

Question (7) of the Applicability Determination screening form asks if the activity involves a managerial or administrative change. If the answer to question (7) is yes, a 10 CFR 50.59 screen is not required. The procedures which will contain the new guidance for unisolating containment penetrations under administrative control are not administrative-type procedures and will be subject to a 10 CFR 50.59 screening. In addition, all individuals performing Applicability Determination and 10 CFR 50.59 screening evaluations must be trained on how to properly answer the screening questions and must maintain an active qualification.

Further, during impact reviews prior to submittal of the LAR to the NRC, Vogtle entered a Technical Evaluation (TE) 821671 into the Corrective Action Program to ensure all procedures are updated as needed. Specifically for TSTF-312, the TE is tracking the change to procedures 14210-1 and 14210-2, Containment Building Penetrations Verification – Refueling.