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SOUTHERN NUCLEAR
A SOUTHERN COMPANY

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NL-16-0098

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

Joseph M. Farley Nuclear Plant – Units 1 and 2
Response to Request for Additional Information for Adoption of
Technical Specifications Task Force Traveler 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.

By letter dated December 30, 2015, the Nuclear Regulatory Commission (NRC) sent SNC a request for additional information (RAI) related to TSTF-312-A. The enclosures to this letter provide SNC's response to the NRC RAI.

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

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 3rd *day of* March*, 2016.*

Notary Public

My commission expires: 1-2-2018

Enclosures:
1. Response to Request for Additional Information
2. Previously Submitted Layout Drawings
3. Farley Nuclear Plant Unit 1 Drawings
4. Farley Nuclear Plant Unit 2 Drawings

cc: Southern Nuclear Operating Company
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Joseph M. Farley Nuclear Plant – Units 1 and 2
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Enclosure 1

Response to Request for Additional Information

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. By letter dated December 30, 2015, the Nuclear Regulatory Commission (NRC) sent SNC a request for additional information (RAI) related to TSTF-312-A. The enclosures to this letter provide SNC's response to the NRC RAI.

Request For Additional Information

In an e-mail from SNC to the NRC dated December 15, 2015, SNC stated the following:

> The FHA [fuel handling event] calculation (SM-96-1064-001) that is described in the Farley response to RAI #5 for TSTF-312-A (ML15271A223, dated 09/28/2015) identified that the NRC had previously documented their review and confirmation of the Farley FHA dose calculation in their SER [safety evaluation report] for License Amendment 165/157. The scope of the NRC review involved confirmation of calculated offsite and control room doses for an FHA event with containment hatches open.
>
> The release path for an in-containment FHA event with the equipment hatch open is modeled in the FHA dose calculation as passing directly to the environment after exiting containment. For FHA events with release through a containment penetration, the release path passes through the auxiliary building, where it is filtered by the penetration area filtration system (PRF) prior to release to the environment.
>
> As part of the review for License Amendment 165/157 SNC submitted excerpts from Farley FHA calculation SM-96-1064-001. As provided in Enclosure 2 to a letter from L. M. Stinson to the U.S. Document Control Desk dated June 10, 2004 (ML041670409), which responded to NRC RAIs [requests for additional information], a summary table of calculated offsite and control room doses was provided for the following FHA scenarios:
>
> - FHA in containment with the equipment hatch open
> - FHA in the auxiliary building with PRF available and 0.5% bypass flow
> - FHA in the auxiliary building with the spent fuel pool area roof hatches open and without PRF filtration (and most recently discharged fuel in the spent fuel pool has decayed at least 676 hours since discharge from the reactor)
>
> The calculated offsite and control room doses for FHA events in the auxiliary building are bounded in both cases by the calculated dose consequences for the FHA event in containment, and are within the dose criteria specified in 10 CFR 100.11 and GDC 19 of 10 CFR Part 50, Appendix A.

The NRC staff is unable to verify that the control room doses for the FHA events in the auxiliary building are bounded in both cases by the calculated dose consequences for the FHA in containment. The proposed TS would not require the PRF to be operable during a potential FHA in containment and the analysis performed without the PRF filtration operable assumes 676 hours rather than the 100 hours as assumed in the current licensing basis.

Please provide either:

1) a detailed justification why these three scenarios are applicable and bounding for the proposed implementation of TSTF-312-A (allowing open containment penetrations when a FHA in containment could occur), or
2) modify the proposed TSs to align the TS with the analyses cited above, or
3) provide a dose analysis of the FHA in containment analyzing the bounding containment configuration (openings to the environment or auxiliary building).

SNC Response to RAI

SNC has chosen to provide option 1 above: a detailed justification why these three scenarios are applicable and bounding for the proposed implementation of TSTF-312-A

By letter dated November 24, 2014, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14335A623), Southern Nuclear Company (SNC) requested approval of multiple previously NRC-approved Technical Specifications Task Force (TSTF) Travelers. Included in this request were changes from TSTF-312-A, Revision 1, "Administrative Control of Containment Penetrations."

Consistent with the changes that were approved for TSTF-312, the proposed changes to the FNP Technical Specifications included the addition of a Note to the Limiting Condition for Operation (LCO) for TS 3.9.3, "Containment Penetrations," that would allow containment penetration flow path(s) that have direct access from the containment atmosphere to the outside atmosphere to be unisolated under administrative control. The proposed changes from TSTF-312 also included the addition of a Note in the TS 3.9.3 Bases directing isolation of open containment penetrations by designated and available individuals in the event of a Fuel Handling Accident.

The changes approved in TSTF-312, included changes that are applicable to both airlock penetrations and piping penetrations. FNP LCO 3.9.3.b was previously amended to allow the personnel and equipment airlocks to remain open during core alterations or movement of irradiated fuel assemblies within the containment, provided one airlock door was available and a designated individual was available to close the open airlock door(s) if needed. Therefore, only those changes from TSTF-312 involving piping penetrations were included within the scope of the license amendment request.

<u>Corrections and Clarifications</u>
The following statement in the 16 December 2015 SNC e-mail is incorrect:

> *For FHA events with release through a containment penetration, the release path passes through the auxiliary building, where it is filtered by the penetration area filtration system (PRF) prior to release to the environment.*

The Fuel Handling Accident (FHA) in containment with a release path via a Containment penetration (i.e., open Personnel Airlock) to the Auxiliary Building does not credit filtering by either the Penetration Room Filtration (PRF) system or the Auxiliary Building Radwaste Area HVAC system. Thus, the unfiltered release path from Containment to the environment via the Personnel Airlock to the Auxiliary Building and the Plant Stack is equivalent to the release via a penetration with direct access to the environment.

Cases 2 and 3, FHAs in the Auxiliary Building with and without PRF filtration, respectively, are not applicable to the Farley TSTF-312-A LAR. Thus no detailed justification will be provided for those cases.

<u>SNC FHA In Containment TSTF-68 LAR Submittal</u>

The NRC previously accepted SNC's FHA analytical methods and assumptions – open Equipment Hatch, open Personnel Airlock, Penetration Room Filtration (PRF) System not credited – in the Safety Evaluation Report (SER) attached to their September 29, 2008 letter (ADAMS # ML082730007) for TSTF-68. From the conclusions on page 12 of that SER:

> *Regarding accident dose issues, NRC staff reviewed the assumptions and justifications used by SNC to assess the radiological impacts of administrative changes to FNP TS 3.9.3, "Containment Penetrations". The NRC staff finds that SNC used methods consistent with regulatory requirements and guidance identified in Section 2.0 above. The NRC staff finds, with reasonable assurance, that in the case of the design basis FHA at FNP the licensee's estimates of the exclusion area boundary, low-population zone, and control room doses will continue to comply with these criteria. Therefore, the proposed changes to TS 3.9.3 are acceptable with regard to the radiological consequences of postulated design basis accidents.*

The term "these criteria" refers to General Design Criteria (16 and 19) and the guidance in Regulatory Guide 1.195.

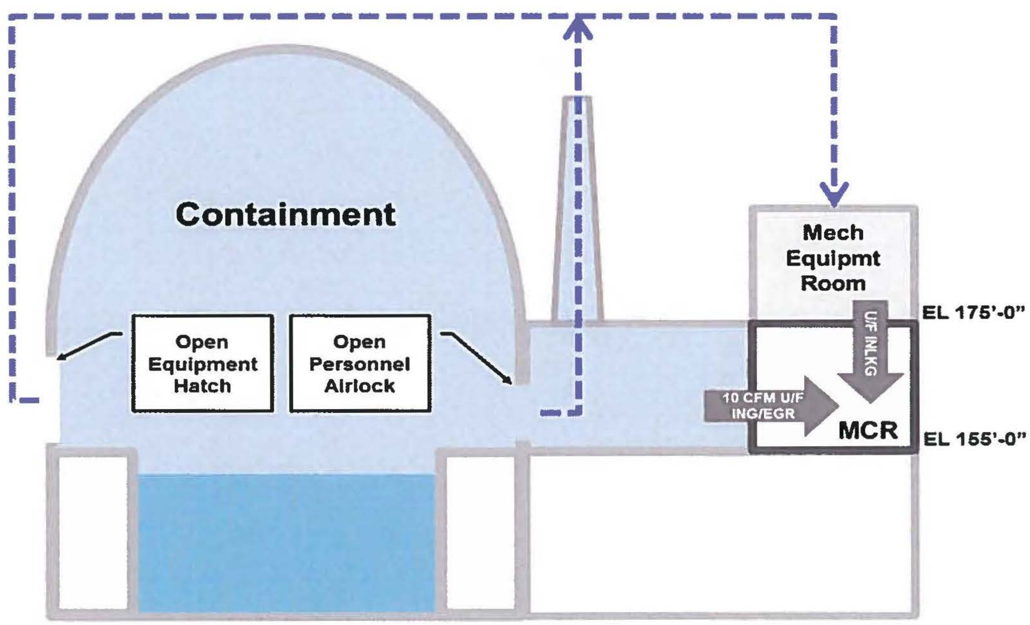
<u>Plant Farley Layout</u>

The spatial relationships among the Control Room, its intakes, the Equipment Hatch, and the Plant Stack are shown in the drawings in Enclosure 2. These drawings were previously provided to the NRC in NL-07-0067 (ADAMS # ML071210081) in support of the SNC TSTF-68 LAR submittal.

The Farley 1&2 architectural drawings (Enclosures 3 and 4), are provided as aids for review.

Unfiltered Inleakage in the Analysis of Record

The FHA in containment analysis of record assumed no direct unfiltered inleakage from the Auxiliary Building area between the open Personnel Airlock and Main Control Room (MCR). Instead, the 10 CFM ingress/egress augmentation per Regulatory Guide 1.195 was assumed to consist of unfiltered inleakage at the control room intakes above the Mechanical Equipment Room. However, based on Figure 1 of Enclosure 2, there is a potential direct unfiltered inleakage path from the Auxiliary Building via the door in the southwest corner of the Control Room. The radionuclide concentration in that area of the Auxiliary Building would be expected to be equal to that of the release exiting the open Personnel Airlock. SNC has conservatively estimated the effect on MCR doses due to 10 CFM ingress/egress unfiltered inleakage from the Auxiliary Building. While the MCR doses increase with this assumption, they continue to meet the Regulatory Guide 1.195 acceptance criteria. The following highly simplified diagram is included for illustration.



Justification of Assumptions

Consistent with the changes approved in TSTF-312, the proposed changes to TS 3.9.3 would allow one or more containment penetrations to be open under administrative control during fuel movement and CORE ALTERATIONS, without imposing any limitation on the number of penetrations that may be open simultaneously.

There is reasonable assurance that the following assumptions used to assess the radiological impacts of a FHA inside Containment with open penetrations under administrative control are applicable and bounding for the proposed implementation of TSTF-312-A.

Assumption: All rods in the dropped assembly are damaged.

Justification: Per section 15.4.5.2 of the Farley FSAR, only the outer row of rods in an assembly is expected to be damaged in an FHA. Per Westinghouse letter ALA-01-057 dated June 12, 2001, full scale fuel assembly and fuel rod drop height testing indicated that for a drop height of 20 feet, no fuel clad strain or buckling occurred and no fuel rods were observed to be leaking following the drop. In addition, this letter reported that in actual fuel handling accidents, spent fuel assemblies had been dropped more than 10 feet with no detectable radioactive release.

Assumption: The released radionuclides are distributed in a mixing volume equal to 90% of the free volume between the operating deck and the elevation of the containment cooling fans: 6.6E+05 cubic feet. No mixing due to fan operation is assumed outside this envelope. This maximizes the radionuclide concentration of the release, which in turn maximizes calculated doses.

Justification: Regulatory Guide 1.195 states that 50% of the Containment free volume may be credited for this initial dilution. From Farley FSAR Table 6.2-1, the containment net free volume is 2.0E+06 cubic feet. As a result, the radionuclide concentration (X mCl/cc) assumed by SNC is ~52% greater than that permitted by Regulatory Guide 1.195:

$X \propto 1/\text{Volume}$

$X_{FNP} \propto 1/(6.6E{+}05\ ft^3)$

$X_{RG1.195} \propto 1/(0.5 \times 2.0E{+}06\ ft^3)$

$X_{FNP}/X_{RG1.195} = [1/(6.6E{+}05\ ft^3)]/[\ 1/(1.0E{+}06\ ft^3)]$

$X_{FNP}/X_{RG1.195} = (1.0E{+}06\ ft^3)/(6.6E{+}05\ ft^3) = 1.52$

Assumption: The total unfiltered release rate from containment to the environment is 53,500 CFM.

Justification: This flow rate is ~110% of the Containment Purge System, with no credit for isolation on high radiation or credit for filtration. During refueling operations, there is no credible mechanism that could create an unfiltered flow rate of this magnitude through unisolated electrical or mechanical containment penetrations.

Assumption: The modeled release paths – the open Equipment Hatch and open Personnel Airlock – can be reasonably assumed to have much lower flow resistances than unisolated mechanical or electrical penetrations. Additionally, only a small fraction of these penetrations are likely to be unisolated at any one time.

Justification: The open Equipment Hatch (D = ~ 18' per drawings D176069 and D206069) and open Personnel Airlock (D = ~9' per drawings D176069 and D206069) have relatively large cross sectional flow areas, unrestricted flow paths, and relatively small length/diameter ratios (L/D $\leq$ ~1 based on drawings D176069 and D206069). By comparison, the unisolated mechanical or electrical penetrations have relatively small cross sectional flow areas, constricted flow paths, and length/diameter ratios much greater than 1.0. Additionally, only a small fraction of these penetrations are likely to be unisolated at any one time due to scheduling and availability of testing equipment and personnel.

Assumption: The release path via the open Personnel Airlock to the Plant Vent Stack maximizes the radionuclide concentration in the Auxiliary Building (EL 155'-0") area between the airlock and the Main Control Room.

Justification: The Personnel Airlock is at the same Auxiliary Building elevation as the MCR. A release path via unsealed electrical or mechanical penetrations would result in a lower radionuclide concentration for the following reasons:

- The release flow rate would be reasonably expected to be much lower than that through the open Personnel Airlock, 2000 CFM. This value was chosen to maximize the radionuclide concentration in the Auxiliary Building area between the open Personnel Airlock and the MCR.
- These penetrations are located at elevations below the Operating Deck, Personnel Airlock, and MCR. Any release via these penetrations would have lower radionuclide concentrations because the containment dilution volume would increase.
- Similarly, these releases would be further diluted by the Auxiliary Building free volume between these lower elevations and the MCR.

Assumption: The radionuclide concentration of the MCR unfiltered inleakage, except for the 10 CFM ingress/egress unfiltered inleakage, is that of the dispersed releases from the open Equipment Hatch and the Plant Stack.

Justification: It is reasonably conservative to assume that the MCR unfiltered inleakage, except for the 10 CFM ingress/egress unfiltered inleakage, is via the HVAC ductwork in the Control Room Emergency Filtration System (CREFS) Mechanical Equipment Room (EL 175'-0") for the following reasons:

- US NRC Generic Letter 2003-01 states that though an MCR may be maintained at a positive pressure relative to surrounding areas, this does not preclude inleakage via the

Control Room Habitability System (CREFS at FNP) fan suction ductwork located outside the Control Room Envelope (CRE).

- The Farley MCR is maintained at a positive pressure relative to the Non-Rad Side of the Auxiliary Building. The MCR pressure is measured in the area adjacent to the Rad Side of the Auxiliary Building. The non-safety-related Auxiliary Building Radwaste Area ventilation system maintains the Rad Side areas of the Auxiliary Building at a slightly negative pressure per Farley FSAR section 9.4.3.1. Though this system cannot be credited for safety analysis purposes, it does increase confidence in the assumption that unfiltered inleakage into the MCR is via the ductwork in the Mechanical Equipment Room.
- Per drawings D176069, D176070, D206069, and D206070 (see Enclosures 3 and 4), the walls and floors of the MCR adjacent to the Rad Side of the Auxiliary Building are air tight and all wall and floor penetrations are sealed airtight as well.
- Under the Control Room Integrity Plan, as set forth in FNP Technical Specification 5.5.18, all MCR penetrations are subject to visual examinations, smoke tube, differential pressure, and other nondestructive test methods. Inspections that identify unfiltered inleakage at locations and rates higher than experienced during tracer gas tests are unacceptable and require repair as needed to maintain compliance with the inleakage rates assumed in the dose analyses.
- Based on a comparison of the CREFS P&IDs, Process Flow Diagrams, and Plan & Section Drawings with the Auxiliary Building airtight delineation drawings (Enclosures 3 and 4), it is seen that the CREFS ductwork runs directly from the Mechanical Equipment Room at EL 175'-0" to the MCR below at EL 155'-0". This ductwork does not pass through potentially contaminated areas of the Auxiliary Building. This ductwork is the majority of the boundary surface areas vulnerable to inleakage because their internal pressures may be below atmospheric conditions.
- Based on this same comparison of drawings, it is seen that the Non-Rad Side (i.e., non-contaminated) HVAC supply and return ductwork to the Computer Room (EL 121'-0") runs down from the Mechanical Equipment Room (EL 175'-0") through a cinderblock chase in the MCR and through the Cable Spreading Room (EL 139'-0"). The Cable Spreading Room is airtight (drawings D176068 and D206068; Enclosures 3 and 4). Though the Computer Room is not airtight, there is no direct communication, other than penetrations, with the potentially contaminated areas of the Auxiliary Building. Though the Computer Room HVAC supply and return ductwork is not isolated in the Mechanical Equipment Room, minimal, if any, unfiltered leakage up through this ductwork can be reasonably expected.

Assumption: The unfiltered inleakage rate via the Mechanical Equipment Room ductwork is approximately an order of magnitude greater than the Technical Specification 5.5.18 maximum of 43 CFM during the emergency recirculation (pressurization) mode of operation.

Justification: This results in a higher radionuclide inleakage rate and significantly increases the MCR doses.

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Enclosure 2

Previously Submitted Layout Drawings

Previously Submitted Layout Drawings
(Enclosure 1 to NL-07-0067, ADAMS # ML071210081)

- Farley Nuclear Plant 1&2 Auxiliary Building EL 155'-0" Layout
- Farley Nuclear Plant 1&2 Auxiliary Roof Ventilation Systems Air Intakes

CTMT Personnel Air locks Open – TSTF 68
NL-07-0067 , Enclosure 1 Page 23 of 24

Figure 1

Auxiliary Building Elevation 155 ft. Layout

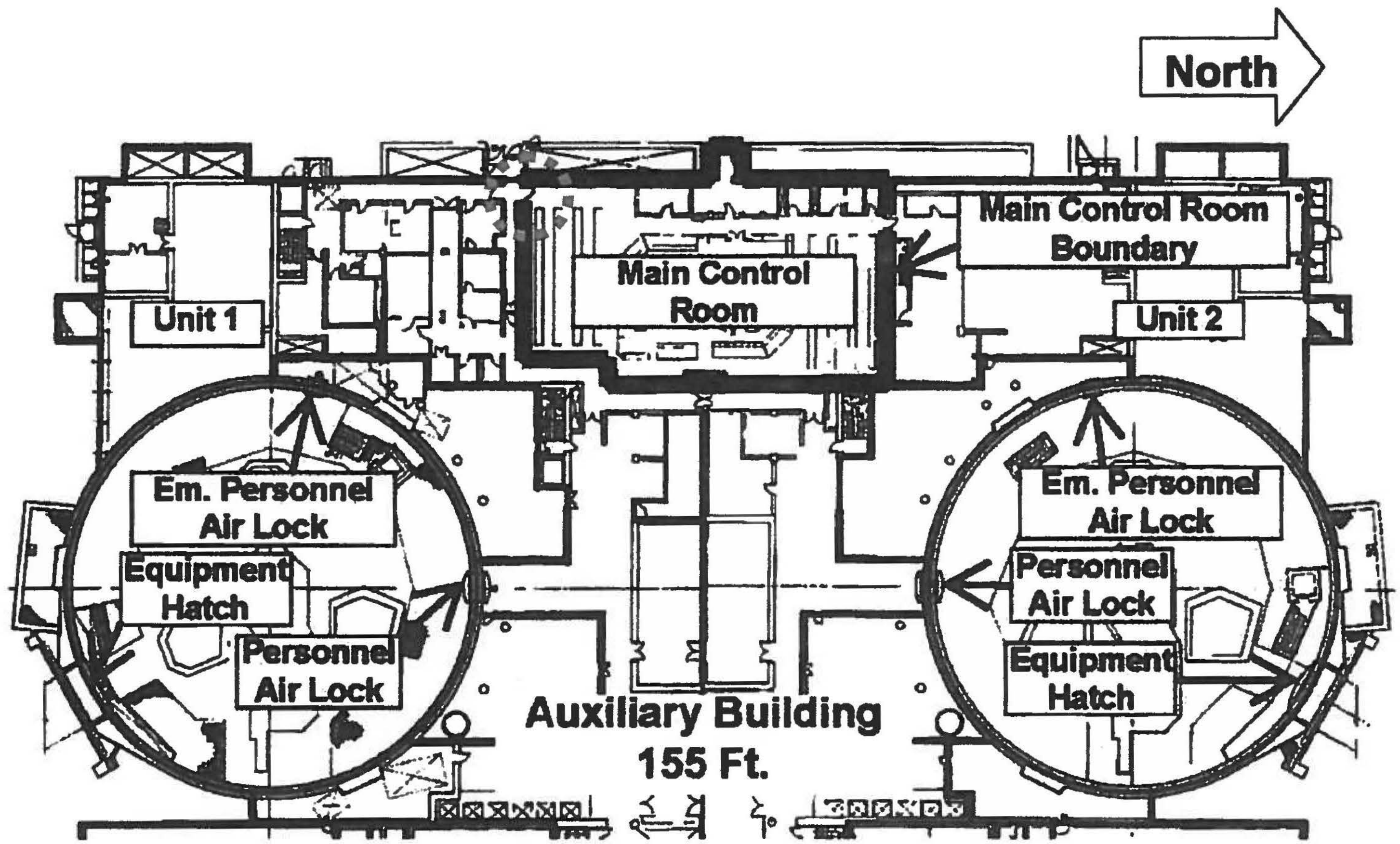

Figure 2

Auxiliary Building Roof Ventilation Systems Air Intakes