From:	Habib, Donald
Sent:	Tuesday, November 19, 2019 1:37 PM
То:	Vogtle PEmails
Subject:	RE: LAR-19-019: Draft to Support Nov. 21, 2019 Pre-submittal Meeting
	(Updated Slides)
Attachments:	LAR-19-019 PSM Slides.pdf

From: Arafeh, Yasmeen N. <YNARAFEH@southernco.com>
Sent: Tuesday, November 19, 2019 12:41 PM
To: Habib, Donald <Donald.Habib@nrc.gov>
Cc: Rankin, Jennivine <Jennivine.Rankin@nrc.gov>
Subject: [External\_Sender] RE: RE: LAR-19-019: Draft to Support Nov. 21, 2019 Pre-submittal Meeting

Don, I made a few editorial corrections to the slides, so I am attaching an updated version to use/distribute instead. Thanks!

Best, Yasmeen Arafeh Nuclear Development, Licensing Work: (205)992-7190 ynarafeh@southernco.com



From: Habib, Donald <<u>Donald.Habib@nrc.gov</u>>
Sent: Tuesday, November 19, 2019 7:11 AM
To: Arafeh, Yasmeen N. <<u>YNARAFEH@southernco.com</u>>
Subject: RE: RE: LAR-19-019: Draft to Support Nov. 21, 2019 Pre-submittal Meeting

**EXTERNAL MAIL: Caution Opening Links or Files** 

Yasmeen –

I received these OK.

Thanks

Don Habib U.S. Nuclear Regulatory Commission Office of Nuclear Reactor Regulation Project Manager, Vogtle Project Office 301-415-1035 From: Arafeh, Yasmeen N. <<u>YNARAFEH@southernco.com</u>>
Sent: Monday, November 18, 2019 3:05 PM
To: Habib, Donald <<u>Donald.Habib@nrc.gov</u>>
Cc: Rankin, Jennivine <<u>Jennivine.Rankin@nrc.gov</u>>; Humphrey, Mark Phillips
<<u>MPHUMPHR@southernco.com</u>>
Subject: [External\_Sender] RE: LAR-19-019: Draft to Support Nov. 21, 2019 Pre-submittal Meeting

Hi Don, attached are the slides that SNC will be using during the PSM for LAR-19-019. Please let me know if you have any questions or difficulties accessing the PDF. Thanks!

Best, Yasmeen Arafeh Nuclear Development, Licensing Work: (205)992-7190 ynarafeh@southernco.com



From: Habib, Donald <<u>Donald.Habib@nrc.gov</u>>
Sent: Monday, November 18, 2019 10:50 AM
To: Humphrey, Mark Phillips <<u>MPHUMPHR@southernco.com</u>>
Cc: Rankin, Jennivine <<u>Jennivine.Rankin@nrc.gov</u>>; Kellenberger, Nicholas
<<u>X2NRKELL@SOUTHERNCO.COM</u>>; Arafeh, Yasmeen N. <<u>YNARAFEH@southernco.com</u>>; Santos,
Cayetano <<u>Cayetano.Santos@nrc.gov</u>>; Patel, Chandu <<u>Chandu.Patel@nrc.gov</u>>
Subject: RE: LAR-19-019: Draft to Support Nov. 21, 2019 Pre-submittal Meeting

**EXTERNAL MAIL: Caution Opening Links or Files** 

#### Mark -

For this upcoming public meeting, we are planning to address LAR 19-019 as the 2<sup>nd</sup> item on the agenda.

There is an ITAAC we are addressing first, then 19-019 is the 2<sup>nd</sup> topic, and 19-017 as the 3<sup>rd</sup> topic.

Thanks Don

From: Humphrey, Mark Phillips <<u>MPHUMPHR@southernco.com</u>>
Sent: Friday, November 08, 2019 2:49 PM
To: Habib, Donald <<u>Donald.Habib@nrc.gov</u>>; Santos, Cayetano <<u>Cayetano.Santos@nrc.gov</u>>
Cc: Grant, Eddie <<u>X2EDGRAN@SOUTHERNCO.COM</u>>; Chamberlain, Amy Christine
<<u>ACCHAMBE@southernco.com</u>>; Agee, Stephanie Y. <<u>SYAGEE@southernco.com</u>>; Arafeh, Yasmeen N.

<<u>YNARAFEH@southernco.com</u>>; Patel, Chandu <<u>Chandu.Patel@nrc.gov</u>>; Redd, Jason P. <<u>JPREDD@southernco.com</u>>; Wu, Si <<u>wu1s@westinghouse.com</u>>; Harper, Zachary S <<u>harperzs@westinghouse.com</u>>

Subject: [External\_Sender] LAR-19-019: Draft to Support Nov. 21, 2019 Pre-submittal Meeting

#### Tanny and Don-

As communicated by Yasmeen Arafeh in her email dated Nov. 5, 2019, SNC is proposing a pre-submittal meeting (PSM) regarding VEGP Units 3 and 4 LAR-19-019 [Reconciliation of Environmental Conditions Inputs to Civil Structural Design Licensing Basis] on Nov. 21, 2019. Please confirm this date is acceptable to the Staff.

SNC is providing the attached draft LAR enclosures for the Staff's consideration to support a 2-week review in advance of the proposed PSM. SNC plans to submit LAR-19-019 on Dec. 17, 2019 following the proposed PSM.

SNC appreciates the opportunity to discuss the draft LAR with the Staff on Nov. 21, 2019, if that date is acceptable. Please contact me with any questions you may have.

Respectfully,

#### Mark P. Humphrey

Licensing Supervisor Nuclear Development Southern Nuclear 3535 Colonnade Parkway Birmingham, AL 35243 O: 205.992.6452 C: 205.215.5152 mphumphr@southernco.com



Hearing Identifier:	Vogtle_COL_Docs_Public
Email Number:	502

Mail Envelope Properties (BN7PR09MB254808A8E47A7C8226C857A2974C0)

Subject: (Updated Slides)	RE: LAR-19-019: Draft to Support Nov. 21, 2019 Pre-submittal Meeting
Sent Date:	11/19/2019 1:36:38 PM
Received Date:	11/19/2019 1:36:42 PM
From:	Habib, Donald

Created By: Donald.Habib@nrc.gov

**Recipients:** "Vogtle PEmails" <Vogtle.PEmails@nrc.gov> Tracking Status: None

#### BN7PR09MB2548.namprd09.prod.outlook.com Post Office:

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MESSAGE	5074		11/19/2019 1:36:42 PM
image001.png	1703		
image002.gif	2058		
LAR-19-019 PSM Slides.pdf		332139	
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No
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### LAR-19-019: Environmental Conditions for Inputs to Civil/Structural Design

November 21, 2019 NRC Pre-Submittal Meeting



### Meeting Purpose and Agenda

#### Meeting Purpose

- Pre-submittal meeting to discuss the proposed changes in LAR-19-019 (WEC LAR-132 Environmental Conditions for Inputs to Civil/Structural Design)
- Receive and address Staff feedback

#### <u>Agenda</u>

- Executive Summary
- Background Information for Critical Section Tables
- Proposed Changes
- Applicable Regulatory Requirements

The information in this presentation is preliminary and will be finalized prior to LAR submittal.

### **Executive Summary**

- The purpose of the LAR is to:
  - align inconsistencies of thermal loads for civil/structural design between UFSAR Appendix 3H and other sections in UFSAR.
  - bring the critical section tables in UFSAR Appendix 3H up to date.
- The impacted critical sections are:
  - Auxiliary Building Basemat
  - o Auxiliary Building Wall 1
  - Auxiliary Building Wall 7.3
  - Auxiliary Building Wall L
  - Shield Building (SB) Roof, including PCS Tank Exterior Walls, Tension Ring (TR), Air Inlets (AI)
  - Spent Fuel Pool West Wall
  - Auxiliary Building Composite Floor
  - Auxiliary Building Tagging Room Ceiling

### **Background Information for Critical Section Tables**

- During AP1000 design certification, a thermal note was added to some of the critical section tables in UFSAR Section 3.8 and Appendix 3H.
- The thermal note clarifies that the design of the critical section tables has considered thermal loads even though the required reinforcement in the tables do not reflect values under combined seismic (SSE) and normal thermal loads.
- As part of LAR-19-019, it is proposed to delete the thermal note from the tables because the SSE and thermal loads are combined, except for the tagging room which has insignificant thermal loads.

Thermal loads have been considered in the design of critical sections. The required reinforcement values shown do not include the load case where seismic and normal thermal loads are numerically combined as the normal thermal loads were assessed to be insignificant. When the seismic and normal thermal loads are numerically combined, the value of required reinforcement may increase; however, in all cases the required reinforcement is less than the provided reinforcement and thus the design of the critical section reinforcement is acceptable.



### **Background Information for Critical Section Tables**

Change Activity	Critical Sections	UFSAR Impact	W/ Thermal Note	LAR-19-019 Proposals
Change No.2	Basemat		Y	Delete Thermal Note;
		Table 3.8.5-3		Update the demands under the load combinations.
	Wall 1	Table 3H.5-2	N	Update the demands under the load combinations to
				correspond to Table 3H.5-2.
			V V	Delete Thermal Note;
		Table 3H.5-3	Table 3H.5-3	Update the demands under the load combinations.
			N	Update the demands under the load combinations to
	W/all 7 3	Table 3H.5-4		correspond to Table 3H.5-5.
	vvali 7.3	Table 3H.5-5	Y	Delete Thermal Note;
				Update the demands under the load combinations.
	Wall L	Table 3H.5-6	Ν	Update the demands under the load combinations to
				correspond to Table 3H.5-7.
		V	Delete Thermal Note;	
		Table 3H.5-7	ř	Update the demands under the load combinations.
	Shield Building AI, TR	Table 3H.5-9,	Y	Delete Thermal Note;
		Sheets 1-2c		Update the demands under the load combinations.
	PCS Tank Exterior	Table 3H.5-9,	, NI	Update the demands under the load combinations.
	Wall	Sheet 3		
	SB Roof	Table 3H.5-15	N	Update the demands under the load combinations.
Change No.3	Spent Fuel Pool Wall	Table 3H.5-8	Ν	Update the demands under the load combinations.
Change No.4	Composito Elect	V	V	Delete Thermal Note;
		Table 3H.5-11	Ĭ	Update the demands under the load combinations.
				Modify Thermal Note;
	Tagging Room Ceiling		Y	Update the table under load combinations without
		Table 3H.5-12		seismic and thermal loads combined.



## Change No.1: Changes of Design Temperature for Thermal Gradient



### Change No.1A: PCS Tank Wall Normal Temperature Change

#### Reason for the Change

- There is an inconsistency of the normal thermal load for the PCS tank between UFSAR Subsection 3H.3.3 & Table 3H.5-1 and UFSAR Table 6.2.2-1 & Technical Specification.
  - UFSAR Table 6.2.2-1 and COL Appendix A SR 3.6.6.1 define the minimum temperature in PCS tank is 40 °F.
  - PCS recirculation heater keeps water in the PCS tank at minimum of 40 °F.
  - UFSAR Subsection 3H.3.3 and Table 3H.5-1 show the water in PCS tank is 70 °F.

#### Proposed Changes:

• Revise the normal thermal load for the PCS Tank in UFSAR Subsection 3H.3.3 and Table 3H.5-1 to be consistent with other sections in UFSAR and design documents. (+70 °F  $\rightarrow$  +40 °F)

## Change No.1B: Auxiliary Building Exterior Walls below Grade and Basemat Accident Thermal Change

#### Reason for the Change

- Table 3D.5-4 defines the abnormal environments as a function of equipment location outside containment. Table 3D.5-5 identifies that the accident environments are the same as the abnormal environments.
- There is an inconsistency of accident thermal loads for the exterior walls below grade and basemat in auxiliary building between UFSAR Table 3H.5-1 and UFSAR Table 3D.5-4.

- Revise the accident thermal loads for the exterior walls below grade and basemat in auxiliary building in UFSAR Table 3H.5-1 to be consistent with UFSAR Table 3D.5-4. (N/R → +50 °F Outside/ +140 °F Inside)
- Clarify the accident thermal temperatures of exterior walls below grade and basemat defined in the table are only applicable to auxiliary building.
- Involved changes in Basemat Table 3.8.5-3 (See Change No.2A) and Wall 1 Table Tables 3H.5-2 and 3H.5-3 (see Change No.2B)
- No impact on Equipment Qualification because no change to Table 3D.5-4.



## Change No.2: Critical Section Tables Update for Auxiliary Building Basemat, Concrete Walls and Shield Building Roof



## Change No.2A: Basemat Critical Section Table Update (Table 3.8.5-3)

### Reason for the Change

- Table 3.8.5-3
  - Shows required and provided reinforcement at two critical locations except for a small portion in the auxiliary building;
  - Has a thermal note, and does not show demands under combined SSE and thermal loads;
  - Does not clarify the exceptions.
- As result of Change No.1B, revise the table with inclusion of combined SSE and thermal loads, and remove the thermal note for the purpose of:
  - Providing quantification of that load combination within UFSAR
  - Simplifying the presentation of the critical section designs in the UFSAR
- In addition, the changes below in calculations impact values in Table 3.8.5-3:
  - Revised liftoff and basic stress analyses utilizing the updated Nuclear Island finite element model;
  - Revised top reinforcement clear cover due to construction requirement;
  - Revised applicability of the 20% margin criteria in reinforcement calculation from the entire basemat to only the area specified in Subsection 3.8.5.4.1.

## Change No.2A: Basemat Critical Section Table Update (Table 3.8.5-3)

- Remove the thermal note.
- Revise the required reinforcement in Table 3.8.5-3.
- Clarify through a note that the table does not include a small portion of basemat (between column line L to 5' east of column line L and shield building to column line 9.2) as shown in UFSAR Figure 3.8.5-3 Sheets 5-7.

# Change No.2B: Wall 1 Critical Section Table Update (Tables 3H.5-2 and 3H.5-3)

### Reason for the Change

- Table 3H.5-2
  - Shows moments and forces for calculation of required reinforcement in Table 3H.5-3.
- Table 3H.5-3
  - Shows required and provided reinforcement;
  - Has a thermal note, and does not show demands under combined SSE and thermal loads;
- As result of Change No.1B, revise the tables with inclusion of combined SSE and thermal loads, and remove the thermal note from Table 3H.5-3 for the purpose of:
  - Providing quantification of that load combination within UFSAR
  - Simplifying the presentation of the critical section designs in the UFSAR
- In addition, the changes below in calculations impact values in Tables 3H.5-2 and 3H.5-3:
  - Expanded load combinations by considering the directionality of the seismic loads combined with thermal, accident pressure, and PRHA loads;
  - Refined meshing in the finite element analysis to simplify the assessment of peak demand from localized loading conditions;
  - Refined thermal reduction factor to better represent the level of cracking in the wall section.

## Change No.2B: Wall 1 Critical Section Table Update (Tables 3H.5-2 and 3H.5-3)

- Update the governing load combinations and corresponding moments and forces in Table 3H.5-2.
- Remove the thermal note from Table 3H.5-3.
- Revise the required reinforcement in Table 3H.5-3
- Revise the provided shear reinforcement between EL.100'-0" and EL.135'-3" in Table 3H.5-3.

# Change No.2C: Wall 7.3 Critical Section Table Update (Tables 3H.5-4 and 3H.5-5)

### Reason for the Change

- Table 3H.5-4
  - Shows moments and forces for calculation of required reinforcement in Table 3H.5-5.
- Table 3H.5-5
  - Shows required and provided reinforcement;
  - Has a thermal note, and does not show demands under combined SSE and thermal loads;
- Revise the tables with inclusion of combined SSE and thermal loads, and remove the thermal note from Table 3H.5-5 for the purpose of:
  - Providing quantification of that load combination within UFSAR
  - Simplifying the presentation of the critical section designs in the UFSAR
- In addition, the changes below in calculations impact values in Tables 3H.5-4 and 3H.5-5:
  - Expanded load combinations by considering the directionality of the seismic loads combined with thermal, accident pressure, and PRHA loads;
  - Refined meshing in the finite element analysis to simplify the assessment of peak demand from localized loading conditions;
  - Refined thermal reduction factor to better represent the level of cracking in the wall section;
  - Revised concrete cover to accommodate embedment plates.

## Change No.2C: Wall 7.3 Critical Section Table Update (Tables 3H.5-4 and 3H.5-5)

- Update the governing load combinations and corresponding moments and forces in Table 3H.5-4.
- Remove the thermal note from Table 3H.5-5.
- Revise the required reinforcement in Table 3H.5-5.
- Revise the provided shear reinforcement from Roof to EL.155'-6" in Table 3H.5-5.

# Change No.2D: Wall L Critical Section Table Update (Tables 3H.5-6 and 3H.5-7)

### Reason for the Change

- Table 3H.5-6
  - Shows moments and forces for calculation of required reinforcement in Table 3H.5-6.
- Table 3H.5-7
  - Shows required and provided reinforcement;
  - Has a thermal note, and does not show demands under combined SSE and thermal loads.
- Revise the tables with inclusion of combined SSE and thermal loads, and remove the thermal note from Table 3H.5-7 for the purpose of:
  - Providing quantification of that load combination within UFSAR
  - Simplifying the presentation of the critical section designs in the UFSAR
- In addition, the changes below in calculations impact values in Tables 3H.5-6 and 3H.5-7:
  - Expanded load combinations by considering the directionality of the seismic loads combined with thermal, accident pressure, and PRHA loads;
  - Refined meshing in the finite element analysis to simplify the assessment of peak demand from localized loading conditions;
  - Refined thermal reduction factor to better represent the level of cracking in the wall section;
  - Revised concrete cover to accommodate embedment plates.
  - Update of MSIV accident pressure and steam generator accident pressure as result of LAR-17-028 (Increase in MSIV Compartment Pressure)

## Change No.2D: Wall L Critical Section Table Update (Tables 3H.5-6 and 3H.5-7)

- Update the governing load combinations and corresponding moments and forces in Table 3H.5-6.
- Remove the thermal note from Table 3H.5-7.
- Revise the required reinforcement in Table 3H.5-7.
- Revise the provided shear reinforcement from EL.135'-3" to EL.154'-2" in Table 3H.5-7.

## Change No.2E: Shield Building Roof Critical Section Table Update (Tables 3H.5-9 and 3H.5-15)

### Reason for the Change

- Table 3H.5-9 Sheets 1-2c
  - Show demands and capacities of the air inlet and tension ring
  - Have a thermal note, and does not show demands under combined SSE and thermal loads
- Table 3H.5-9 Sheet 3 and Table 3H.5-15
  - Show demands and capacities of the PCS tank exterior wall and conical roof
  - No thermal note, and only show demands under combined SSE and normal thermal loads
- PCS Tank Exterior Wall is subject to normal thermal
  - 40°F (inside)/-40°F (outside) and 40°F (inside)/115°F (outside)
- Air inlet and tension ring are next to the upper annulus interior, and are subject to accident thermal
  - 165°F (inside)/115°F (outside) and 10°F (inside)/-40°F (outside)
- Conical roof is above the containment vessel, and is subject to air which can be heated up after passing through the bottom of the air baffle and beginning to rise.
  - 180°F (inside)/115°F (outside) and 120°F (inside)/-40°F (outside)
- Revise Tables 3H.5-9 and 3H.5-15 with inclusion of combined seismic and normal/accident thermal load combinations, and remove the thermal note for the purpose of:
  - Providing quantification of that load combination within the licensing basis
  - Simplifying the presentation of the critical section designs in the licensing basis

## Change No.2E: Shield Building Roof Critical Section Table Update (Tables 3H.5-9 and 3H.5-15)

- Remove the thermal note from Table 3H.5-9 Sheets 1-2c.
- Revise the demands and demand capacity ratio in Table 3H.5-9 Sheets 1-2c to reflect demands under the load combinations including combined seismic and thermal loads.
- Revise the demands and demand capacity ratio in Table 3H.5-9 Sheet 3 and Table 3H.5-15 to reflect demands under the load combinations including combined seismic and accident thermal loads.



## Change No.3: Spent Fuel Pool West Wall Critical Section Table Update (Table 3H.5-8)



# Change No.3: Spent Fuel Pool West Wall Critical Section Table Update (Table 3H.5-8)

### Reason for the Change

- Table 3H.5-8 Sheets 1-7
  - Show demands and capacities of the SFP west wall at seven critical locations.
- Revision of the design calculations to clarify detail and document explicit quantification of the load combinations resulted in the following changes which impact the demands in UFSAR Table 3H.5-8:
  - Combined accident thermal with seismic loads in the load combinations for SFP wall to provide quantification of that load combination within the UFSAR;
  - Refined meshing in the finite element analysis to simplify the assessment of peak demand from localized loading conditions;
  - Refined boundary conditions in the finite element analysis to better capture potential behavior of the floor to wall connection as approved in LAR-16-009 (Structural Design of Auxiliary Building Floors)

- Revise moments and forces in Table 3H.5-8.
- Add load combinations with seismic and accident thermal combined in Table 3H.5-8.
- Clarify in the notes in Table 3H.5-8 that the maximum principal stress and maximum stress intensity range shown are under the load combinations.
- Update maximum principal stress and/or maximum stress intensity range in Table 3H.5-8.



## Change No.4: Critical Section Tables Update for Auxiliary Building Floors



# Change No.4A: Composite Floor Critical Section Table Update (Table 3H.5-11)

### Reason for the Change

- Table 3H.5-11
  - Shows demands and capacities of steel beam and concrete slab;
  - Has a thermal note, and does not show required reinforcement under combined SSE and thermal loads.
- Revision of the design calculations to clarify detail and document explicit quantification of the load combinations resulted in the following changes are made which impact the demands in UFSAR Table 3H.5-11:
  - Modified seismic mass by counting 25% of live load instead of 100% of the live load
  - Refined floor vertical seismic acceleration
  - Account for air handling unit loads

- Update the governing load combination and corresponding demands in Table 3H.5-11.
- Delete the thermal note in Table 3H.5-11.

# Change No.4B: Tagging Room Ceiling Critical Section Table Update (Table 3H.5-12)

### Reason for the Change

- Table 3H.5-12
  - Shows demands and capacities of pre-cast panels and cast-in-place concrete slab;
  - Has a thermal note, and does not show demands under combined SSE and thermal loads.
- Revision to the design calculations to better capture the behavior of the structure and to incorporate revised design methodology as discussed below results in impact on the demands in UFSAR Table 3H.5-12:
  - Refined analysis to more accurately account for 2-way behavior of the slab
  - Change as approved in LAR-14-003 (Auxiliary Building Structural Floor Details)

- Update the governing load combination and corresponding demands of 24-inch thick slab in Table 3H.5-12.
- Revise the thermal note in Table 3H.5-12 to clarify that both normal and accident thermal loads were evaluated to be insignificant.

### **Applicable Regulatory Requirements**

- <u>GDC 1</u> Quality Standards and Records
- <u>GDC 2</u> Design bases for protection against natural phenomena
- <u>GDC 4</u> Environmental and dynamic effects design bases
- <u>10 CFR Part 50, Appendix S</u> Earthquake Engineering Criteria for Nuclear Power Plants
- <u>10 CFR 50.150</u> Aircraft Impact Assessment



## **Questions/Discussion**