Vogtle PEmails

From: Habib, Donald
Sent: Wednesday, June 13, 2018 8:45 AM
To: Vogtle PEmails
Subject: FW: Draft Response to RAI LAR-17-037-2, re: Critical Structures
Attachments: LAR-17-037S3-SEB RAI Response - Draft.pdf

Importance: High

From: Haggerty, Neil [mailto:X2NHAGGE@SOUTHERNCO.COM]
Sent: Tuesday, June 12, 2018 5:03 PM
To: Habib, Donald <Donald.Habib@nrc.gov>
Cc: Patel, Chandu <Chandu.Patel@nrc.gov>; Hoellman, Jordan <Jordan.Hoellman2@nrc.gov>; Aughtman, Amy G. <AGAUGHTM@SOUTHERNCO.COM>; Sparkman, Wesley A. <WASPARKM@southernco.com>; Redd, Jason P. <JPREDD@southernco.com>; Amundson, Theodore Edwin <X2TAMUNS@southernco.com>; Hicks, Thomas E. <X2TEHICK@southernco.com>; Zach Harper (WEC) <harperzs@westinghouse.com>; 'Baker, Tod H' (bakerth@westinghouse.com) <bakerth@westinghouse.com>
Subject: [External_Sender] Draft Response to RAI LAR-17-037-2, re: Critical Structures
Importance: High

Don,

As discussed, attached is the draft response to RAI LAR-17-037-2, regarding Critical Structures.

Please share this draft response with the technical staff associated with this RAI, in support of the planned Public call on Thursday, June 14.

This document contains NO SUNSI, and maybe be provided to the Public. Please note that it is a DRAFT document.

Thank you,

Neil Haggerty

Neil Haggerty | Southern Nuclear Operating Company
Nuclear Development Regulatory Affairs – VEGP 3&4 Licensing
SNC-Inverness: 205.992.7047 | office: 301.874.8537 | mobile: 240.566.2442
x2nhagge@southernco.com
neil.haggerty@excelservices.com

Hearing Identifier: Vogtle_COL_Docs_Public
Email Number: 299

Mail Envelope Properties (BY1PR09MB09352CD5A4FFBE5804E0F226977E0)

Subject: FW: Draft Response to RAI LAR-17-037-2, re: Critical Structures
Sent Date: 6/13/2018 8:45:16 AM
Received Date: 6/13/2018 8:45:22 AM
From: Habib, Donald

Created By: Donald.Habib@nrc.gov

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

Post Office: BY1PR09MB0935.namprd09.prod.outlook.com

Files	**Size**	**Date & Time**
MESSAGE	1824	6/13/2018 8:45:22 AM
LAR-17-037S3-SEB RAI Response - Draft.pdf	945713	

Options
Priority: High
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

Southern Nuclear Operating Company

ND-18-0xxx

Enclosure X

Vogtle Electric Generating Plant (VEGP) Units 3 and 4

Response to NRC Request for Additional Information (RAI) 17-037-2

Regarding the LAR-17-037 Review

(LAR-17-037S3)

Supplement 3 changes to the original LAR text are shown as blue-underlined text; deletions of original LAR text are shown as ~~red strikethrough~~ text.

(This Enclosure consists of eleven pages, including this cover page.)

The following is a question provided by the NRC Staff [Request for Additional Information (RAI) LAR 17-037-2] regarding the review of Southern Nuclear Operating Company (SNC) License Amendment Request (LAR) 17-037, which was submitted by SNC letter ND-17-1726 on December 21, 2017 [ADAMS Accession No. ML17355A416].

Question

The final safety analysis report of the Vogtle Electric Generating Plant (VEGP) Units 3 and 4 references the Westinghouse AP1000 certified design. Appendix D to 10 CFR Part 52, "Design Certification Rule for the AP1000 Design," provides the regulatory requirements for the AP1000 design. 10 CFR Part 52, Appendix D, Section VIII.B.6.c provides a list of Tier 2* matters, including a design summary of critical sections, that a licensee who references this appendix may not depart from without NRC approval. Furthermore, SECY-17-0075, "Planned Improvements in Design Certification Tiered Information Designations," described the staff's approach to using the Tier 2* designation for safety significant information. The SECY noted that if Tier 2* were to be eliminated, certain safety-significant information currently in Tier 2* should be included in Tier 1 rather than in Tier 2. The staff considers that a "critical section" has attributes that make it safety significant in maintaining the integrity of the plant structure. The designed capacity of the "critical sections" support the reasonable assurance of safety determination for the AP1000 DCD, Rev.19 design in the staff safety evaluation.

The staff reviewed the LAR and noted that the criteria for screening Tier 2* information pertaining to "critical sections" is not well defined.

In Enclosure 3, "Proposed Changes to Licensing Basis Documents," of the LAR, the licensee proposed to revise its combined license (COL) to include a new license condition to address the Tier 2* change process. The licensee included a new license condition, proposed License Condition 13, "Departures from Plant-Specific DCD Tier 2* Information." The proposed license condition states that the licensee

> . . . is exempt from the requirements of 10 CFR Part 52, Appendix D, Paragraphs II.F and VIII.B.6 that invoke the Tier 2* change process that requires prior NRC approval via a license amendment for departures from Tier 2* information; and Paragraph VIII.B.5.a for Tier 2 information that involves a change to, or departure from, Tier 2* information; except for departures from Tier 2* information that:
>
> 1. Involve design methodology or construction materials that deviate from a code or standard credited in the plant-specific DCD for establishing the criteria for the design or construction of a structure, system, or component (SSC) important to safety."

The proposed license condition is not clear as to how the critical sections associated with the steel-concrete (SC) modular construction would be screened using the above criteria because information from analysis and tests were used in conjunction with codes and

standards for the design of SC modules. As approved in the certified design, linear analysis, nonlinear analysis, and testing of the SC module design were performed and the results were compared to provisions of two different codes in order to validate the use of the codes.

The staff considers that the critical sections have safety significance in assuring the integrity of the building which house safety related systems and components. The proposed Criterion 1 relies on code compliance in the design and detailing of the critical sections to screen out details that are code controlled. The application of this criteria may lead the applicant to conclude that the parameters of the critical sections can be modified in the field using available NRC change processes without resorting to the license amendment process. The staff finds instances where the application of this criterion will not yield the desired results. The staff has identified the following cases as exceptions to the Criterion 1:

- Critical sections using steel concrete sandwich construction, and
- the capacity aspects such as area of steel provided or the demand to capacity ratio of critical sections using reinforced concrete

In both cases, the staff has determined that neither the design nor the cited attributes of the critical sections are code defined, making Criterion 1 in-applicable in these instances. The staff requests the applicant to revise the Criterion 1 such that the conditions identified above are screened in and a license amendment process followed for any changes to these cases, or that the applicant provide additional explanation as to why the proposed criteria would not need to be revised in order to maintain a reasonable assurance of safety.

SNC Response to RAI Question

Tier 2* information is intended to have substantial safety significance, commensurate with information designated as Tier 1. However, as noted in SECY-17-0075, “Planned Improvements in Design Certification Tiered Information Designations,” [ADAMS Accession Number ML16196A321], the Tier 2* scope identified in previous design certifications, such as AP1000, may be broader than necessary, and includes information more appropriately designated as Tier 2. SNC proposes to invoke a process whereby VEGP 3 and 4 Tier 2* departures would be submitted to the NRC for prior approval when the safety level of the change rises to that which is commensurate with the safety level of Tier 1 information.

While Updated Final Safety Analysis Report (UFSAR) Appendix 3H, *Auxiliary and Shield Building Critical Sections*, contains significant critical section detailed design, including detailed figures of critical sections, the majority of the AP1000 structural design requirements are derived from applicable codes. SNC acknowledges that for steel-concrete composite regions of the nuclear island and the shield building design, nonlinear analysis and testing were performed to validate the use of applicable codes. The performance of these activities, however, does not invalidate SNC’s position that the design of the shield building and other critical sections is based in large

part on meeting applicable industry codes. Hence, the proposed evaluation Criterion 1, which requires prior NRC approval for any Tier 2* text, table or figure change that deviates from these codes, combined with the 10 CFR Part 52, Appendix D, Section VIII.B.5 evaluation criteria, does provide a reasonable assurance of safety.

Nevertheless, SNC has identified enhancements to Criterion 1 that expand the scope of this criterion to include requirements described in the UFSAR that supplement code requirements for critical sections (discussed below).

Structural Design Change Process

Westinghouse is the design authority for the Vogtle 3&4 AP1000 units; conducting such activities under the detailed supervision of SNC as the Licensee. Any change to the design of Vogtle 3&4, regardless of its scope or potential impact, is subjected to a rigorous process(es) under 10 CFR Part 50 Appendix B Quality Assurance Program controls regarding both technical and regulatory aspects. At this time, SNC is not aware of any pending changes which would be implemented under the proposed Tier 2* change process, e.g. there is no backlog of changes awaiting NRC approval of this LAR.

Proposed changes may enter the design control and licensing control processes in several ways; the most common are field-identified changes and those changes identified in advance during work planning (including by use of clash-identifying modeling software), procurement, and impact reviews from other changes. Those deviations from Tier 2* details of critical sections discovered in the field are documented per the site 10 CFR 50 Appendix B design control and corrective action programs, dispositioned via the design control and licensing control processes, and tracked for consideration in future changes and the as-built reconciliation report. Changes may also be initiated via field change requests and design changes requests when a challenge is identified prior to field construction.

Regardless of the design control process entry method or originating location (i.e. at Vogtle site or offsite), all proposed design changes proceed through detailed technical and regulatory reviews. WEC Engineering performs a technical review of the proposed change to first determine whether all applicable design requirements are satisfied. This effort includes evaluating the stress at the proposed change location, the impact of prior nearby design changes on the proposed change, and the impact of the proposed change on the structural member (and by extension, entire Nuclear Island) in consideration of the overall cumulative impact of the proposed and prior design changes. This review of impacts both locally and cumulatively occurs with each proposed change, thus precluding a finding at the end of the construction effort that the structure no longer conforms to the approved design or will not withstand the design basis loads specified in the Design Description without loss of structural integrity or the safety related functions. In close coordination, the proposed change is evaluated for regulatory impacts and the appropriate licensing change process entered as necessary. The license conditions proposed by this LAR ensure that key critical section structural attributes of the Vogtle units are maintained and that adverse changes to those attributes undergo prior NRC review and approval. Examples of non-adverse changes include minor deviations in rebar spacing or changes in weld details which don't materially alter the load distribution through the structure; adverse changes affect the strength, stiffness, ductility, or dynamic response of an element.

If the proposed design change is found to be acceptable technically and has received the proper regulatory approvals, the design change is implemented through updates to drawings and

associated documents for field construction. Within the design control software program employed by Westinghouse, Intergraph SmartPlant, changes to the design are tracked against the relevant drawings, calculations, and computer models. This linking and updating of changes to the design documents both ensures that future changes to the same structural members consider the implemented changes, and that when the as-built design reconciliation report (see Tier 1 Table 3.3-6 Design Commitment 2a) is prepared such changes to the COL-approved design are considered.

In addressing the staff's question, this response is divided into three areas: reinforced concreted (RC) design; steel-concrete composite module (SC) design; and shield building design.

RC Design

Design requirements for RC structures are governed by accepted industry codes as described in the following UFSAR subsections:

- UFSAR Subsection 3H.3.1, *Governing Codes and Standards*, describes the primary codes and standards used in the design of the auxiliary and shield buildings: American Concrete Institute (ACI) standard ACI 349-01, "Code Requirements for Nuclear Safety Related Concrete Structures" (and Subsection 3.8.4.5.1 for supplementary requirements and Subsection 3.8.4.4.1 for alternative requirements); American National Standards Institute (ANSI) / American Institute of Steel Construction (AISC) standard ANSI/AISC N690-1994, "Specification for the Design, Fabrication and Erection of Safety-Related Steel Structures for Nuclear Facilities" (and Subsection 3.8.4.5.2 for supplemental requirements); American Welding Society (AWS), Structural Welding Code - Steel, AWS D1.1-2000 (provides an acceptable alternative for AISC N690 weld requirements as described in Subsections 3.8.3.2 and 3.8.4.2).
- UFSAR Subsection 3H.5.1, *Shear Walls*, states that the wall sections are designed in accordance with the requirements of ACI 349-01.
- UFSAR Subsection 3H.5.2, *Composite Structures (Floors and Roof)*, states that the designs of the floors are in conformance with AISC N690 and ACI 349. This section also requires that the reinforcement size and spacing are based on loads and spans for this type of floor and are determined at each location based on the requirements in ACI 349 and ACI 318-11. The slab concrete and the reinforcement is designed to meet the requirements of ACI 349-01.
- UFSAR Subsection 3H.5.3, *Reinforced Concrete Slabs*, states that the design of these floors is in conformance with AISC N690 and ACI 349. The reinforcement size and spacing are determined for each location, based on specific loads and spans, and satisfy the requirements in ACI 349 and ACI 318-11. The precast panels are connected to the concrete placed above them by shear reinforcement which satisfies the requirements of ACI 349.
- UFSAR Subsection 3H.5.4, *Concrete Finned Floors*, states that the finned floors are designed as reinforced concrete slabs in accordance with ACI 349. Composite section properties, based on an all steel-transformed section, as detailed in Section Q1.11 of ANSI/AISC N690-94 are used to design the weld strength between stiffener and the steel plate and the spacing of the shear studs for the composite action. The plate is designed against the criteria for bending and shear, specified in ANSI/AISC N690-94.

These codes provide requirements for design and construction of reinforced concrete structures, including allowable capacity aspects such as the demand-to-capacity ratio of walls and floors

using reinforced concrete. Nevertheless, to address the NRC staff's concern regarding the ability to change the demand-to-capacity ratios for reinforcement in critical sections, SNC proposes to add restrictions to Criterion 1 regarding these ratios as described below.

Potential changes in reinforcement that need to be accommodated due to construction are generally localized (e.g., a missing reinforcing bar due to an interference) and are readily accommodated within design basis code commitments. Changes that affect the overall capacity of a structural member (e.g., changing the typical size and spacing of the reinforcement in a reinforced concrete wall) are not anticipated, and NRC staff prior review and approval of such a change aligns with the spirit of the Tier 2* designation. Therefore, it is proposed to add language to exclude from Criterion 1 localized conditions that continue to meet the design basis code and supplemental code requirements except for adherence to a reported capacity measure in one of the critical section UFSAR Section 3.8 or Appendix 3H tables (e.g. area of reinforcing steel in a wall face). The values for demand, or by proxy the "Required" area of steel reinforcement, stated in the UFSAR Section 3.8 and Appendix 3H Tables were derived from structural analyses which calculated the demand in discrete elements of the AP1000 structures. The greatest demand calculated for a defined critical section location (i.e. from Table 3H.5-3 - Wall on Column Line 1; Wall Section 5; Elevation 82'-6" to 66'-6"; Outside Face; Vertical) was input into the respective Table to ensure that the "Provided" area of steel was sufficient and to maximize the demand-to-capacity ratio value.

An example of a common situation during construction is when a reinforcing bar is moved or cannot be placed due to interference. To address this situation and ensure that the critical section structure continues to perform as expected, the design authority may choose to examine the demand-to-capacity ratio of the member. Thus, the design authority examines the ratio of required reinforcement to provided reinforcement across the area of a critical section structural member, calculated per design analysis demand and actual provided area of steel values (accounting for the missing rebar area of steel for example), and verifies that the resulting ratio does not exceed that ratio value stated in or calculated from UFSAR Section 3.8 and Appendix 3H Tables Tier 2* values for the applicable structural member. Provided that all Code requirements are satisfied and the demand-to-capacity ratio of the member based on the applicable Tier 2* values are not exceeded, then the change could be implemented in accordance with the Tier 2 change process.

SC Design

Design requirements for SC module design are primarily governed by accepted industry codes as described in the following UFSAR subsections:

- UFSAR Subsection 3.8.3.5.3, *Structural Wall Modules*, states that structural modules without concrete fill, such as the west wall of the in-containment refueling water storage tank, are designed as steel structures, according to the requirements of AISC N690. Concrete-filled structural wall modules are designed as reinforced concrete structures in accordance with the requirements of ACI 349 and other code requirements as detailed in this UFSAR subsection. The reinforcing steel used to anchor the modules to the concrete has a development that satisfies the requirements of ACI 349.
- UFSAR Subsection 3H.3.1, Governing Codes and Standards, describes the primary codes and standards used in the design of the auxiliary and shield buildings: ACI 349-01, "Code Requirements for Nuclear Safety Related Concrete Structures" (and Subsection 3.8.4.5 for supplementary requirements and Subsection 3.8.4.4.1 for alternative requirements); ANSI/AISC N690-1994, "Specification for the Design, Fabrication and

Erection of Safety-Related Steel Structures for Nuclear Facilities" (and Subsection 3.8.4.5 for supplemental requirements); American Welding Society (AWS), Structural Welding Code - Steel, AWS D1.1-2000 (provides an acceptable alternative for AISC N690 weld requirements as described in Subsections 3.8.3.2 and 3.8.4.2).

- UFSAR Subsection 3H.5.5, *Structural Modules*, states that the design methodology of these modules in the auxiliary building is similar to the design of the structural modules in the containment internal structures described in Subsection 3.8.3.5.3. These modules include the spent fuel pool, fuel transfer canal, and cask loading and cask washdown pits.
    - UFSAR Subsection 3H.5.5.1, *West Wall of Spent Fuel Pool*, states that the concrete filled structural wall modules are designed as reinforced concrete structures in accordance with the requirements of ACI 349. The face plates are treated as reinforcing steel.

These codes provide a comprehensive set of requirements for SC structures. However, SNC acknowledges that the UFSAR describes requirements for the design of SC modules that supplement the code requirements in some areas, as follows:

- UFSAR Subsection 3.8.4.5.2, provides supplemental requirements for steel structures beyond AISC N690.
- UFSAR Subsection 3H.3.4, provides supplemental requirements to AISC N690 for load combinations and stress limit coefficients.

In recognition of the nonlinear analysis and testing that was performed to support the design and licensing of the SC modules employed in the AP1000 design, Criteria 1 is modified as shown below.

Shield Building Design

The shield building uses SC as well as RC construction. As described in the UFSAR, Subsection 3.8.4.1.1, *Shield Building*, and Appendix 3H the design of much of the shield building is based on compliance to codes. This point is stated in NUREG-1793, *Final Safety Evaluation Related to Certification of the AP1000 Standard Design," Supplement 2*, Subsection 3.8.4.1.1.3.1, *Design Methodology and Process for Shield Building Design*, [ADAMS Accession No. ML112061231] which states:

"…the concrete design of the following areas of the AP1000 shield building falls directly within the scope of ACI 349:

- shield building roof
- knuckle region of the roof near the PCCWST wall
- compression ring
- PCCWST

The applicant designed these areas in accordance with the provisions in the established design codes by using linear elastic analysis methods. Specifically, the design for the sections in these areas is based on compliance with the ACI 349 Code, as supplemented with guidance in NRC Regulatory Guide (RG) 1.142 for concrete structures. The design of the sections in these areas, which uses established design codes and analysis methods listed in Section 3.8.4 of NUREG-0800, satisfies the regulatory basis listed above and is, therefore, acceptable to the staff….

> …The applicant's integrated design process also makes use of the design process for structural steel components in certain areas of the shield building. Specifically, it uses ANSI/AISC N690 in designing structural steel components of seismic Category I structures. The applicant used ANSI/AISC N690 in designing the following areas of the shield building:
>
> - the steel roof that supports the concrete roof slab
> - tension ring
> - SC/RC connection
>
> The design process uses provisions from two different design codes: ACI 349 Code for RC components, which uses an ultimate strength design approach and ANSI/AISC N690 Standard for steel and composite components, which uses an allowable stress design approach."

The proposed evaluation Criterion 1, which addresses deviations from codes, does provide sufficient restrictions (i.e., obtain prior NRC staff approval) on shield building design changes involving these above areas when the change deviates from these codes.

However, SNC acknowledges that ACI 349 and ANSI/AISC N690 are not exclusively applicable to the shield building SC wall modules, including connections to RC. For example, there is significant design requirement information beyond code requirements in UFSAR Subsection 3.8.7, Reference 57, *APP-GW-GLR-602, Revision 5 (Proprietary) and APP-GW-GLR-603, Revision 5 (Non-Proprietary), "AP1000 Shield Building Design Details for Select Wall and RC/SC Connections*" [ADAMS Accession No. ML110910541]. Furthermore, there are additional UFSAR sections that provide supplemental design requirements beyond code requirements that SNC acknowledges are important to the design of the shield building. For example, UFSAR Subsection 3.8.4.5.5, *Shield Building Structural Wall Modules*, states that design requirements for shield building concrete-filled structural wall modules are addressed in UFSAR referenced codes and supplemental requirements not addressed in codes:

> "*[Concrete-filled structural wall modules are designed as reinforced concrete structures in accordance with the requirements of ACI 349, and supplemented with additional requirements discussed in subsection 3.8.3.5.3 and below…]**

[Note that UFSAR Subsection 3.8.3.5.3 is Tier 2 text.] Within UFSAR Subsection 3.8.4.5.5, supplemental Tier 2* design requirements for the shield building are addressed in Subsection 3.8.4.5.5.5, *Design of Shear Studs and Tie Bars*. Note that the UFSAR specifically identifies the structural steel rods between shield building SC faces as tie bars, not traditional deformed reinforcing bar performing common reinforcing functions, thus discussions of treatment of reinforcing bars should not be directly applied to those tie bars.

SNC recognizes that due to the unique non-symmetries of the shield building with regard to its location within the nuclear island footprint and the varying elevation of the SC-to-RC connection around its circumference, that great diligence must be applied to any proposed change. The design control process applied under 10 CFR Part 50 Appendix B identifies whether a proposed change will affect the strength, stiffness, ductility, or dynamic response of an element such that the overall shield building is adversely affected. Proposed local changes such as revision of reinforced concrete details which are found by analysis to not adversely affect the global response of the shield building would typically be acceptable to perform under the Tier 2 change process.

Other proposed changes such as systematically eliminating tie bars in the shield building SC modules or revising a connection such that the load distribution is dramatically changed, thereby adversely affecting the dynamic behavior of the shield building would require prior NRC approval.

By including these additional shield building requirements within the scope of proposed evaluation Criterion 1, combined with the 10 CFR Part 52, Appendix D, Section VIII.B.5.b evaluation criteria, the new evaluation process will provide a reasonable assurance of safety.

Changes to Original LAR-17-037 in response to RAI LAR-17-037-2

Changes to Enclosure 1:

On Page 10 of 19, revise the Criterion 1 detailed guidance as follows:

> Criterion 1 (Codes and Standards and Supplemental Design Requirements) detailed guidance
>
> * * *
>
> - Any change to the Tier 2* design requirements described in UFSAR Subsections 3.8.4.5.1, 3.8.4.5.2, 3.8.4.5.5, or 3H.3.4 is a deviation.
> - Any change to UFSAR Subsection 3.8.7, Reference 57 is a deviation.
> - Any change that results in the ratio of required reinforcement to provided reinforcement across the area of a critical section structural member, calculated per design analysis demand and actual provided area of steel values, exceeding that ratio value stated in or calculated from UFSAR Section 3.8 and Appendix 3H Tables Tier 2* values for the applicable structural member is a deviation.
> - Any change that results in changes to SC module walls in the Nuclear Island or Shield Building; Shield Building SC-to-RC connections; or Shield Building RC regions that adversely affects the strength, stiffness, ductility, or dynamic response of an element is a deviation.

On Page 10 of 19, revise Criterion 1 Bases discussion by adding the following paragraphs after the existing paragraph:

> It is also noted that the UFSAR describes additional requirements for the design of critical sections that supplement the code requirements in some areas such as reinforced concreted (RC) design; concrete-filled steel plate construction (SC) module design; and shield building design. References to these requirements are included in this Criterion and prior NRC approval is required if deviations are proposed to these requirements.
>
> Furthermore, Criterion 1 contains restrictions regarding the ability to change demand-to-capacity ratios for reinforcement in critical sections without prior NRC staff approval. The Criterion requires prior NRC approval for any change that involves a deviation from the demand-to-capacity ratios specified in UFSAR Section 3.8 and Appendix 3H Tier 2* tables such that the ratio of required reinforcement to provided reinforcement across the area of a critical section structural member, calculated per design analysis demand and actual

provided area of steel values, exceeds that ratio value stated in or calculated from UFSAR Section 3.8 and Appendix 3H Tables Tier 2* values for the applicable structural member. The values for demand, or by proxy the "Required" area of steel reinforcement, stated in the UFSAR Section 3.8 and Appendix 3H Tables were derived from structural analyses which calculated the demand in discrete elements of the AP1000 structures. The greatest demand calculated for a defined critical section location (i.e. from Table 3H.5-3 - Wall on Column Line 1; Wall Section 5; Elevation 82'-6" to 66'-6"; Outside Face; Vertical) was input into the respective Table to ensure that the "Provided" area of steel was sufficient and to maximize the demand-to-capacity ratio value.

Potential changes in reinforcement that need to be accommodated due to construction are generally localized (e.g., a missing reinforcing bar due to an interference) and are readily accommodated within design basis code commitments. Changes that affect the overall capacity of a structural member (e.g., changing the overall size and spacing of the reinforcement in a reinforced concrete wall) are not anticipated, and NRC staff review and approval of such a change is required.

Additionally, due to the unique non-symmetries of the shield building with regard to its location within the nuclear island footprint and the varying elevation of the SC-to-RC connection around its circumference, no changes are permitted to SC module walls in the Nuclear Island or Shield Building, Shield Building SC-to-RC connections, or Shield Building RC regions that adversely affect the strength, stiffness, ductility, or dynamic response of an element without prior NRC staff review and approval. The design control process applied under 10 CFR 50 Appendix B identifies whether a proposed change will affect the strength, stiffness, ductility, or dynamic response of an element such that the overall shield building is adversely affected. Proposed local changes such as attachment of miscellaneous low energy small bore piping hanger steel to SC modules or revision of reinforced concrete details which are found by analysis to not adversely affect the global response of the shield building would typically be acceptable to perform under the Tier 2 change process. Other proposed changes such as systematically eliminating tie bars in the shield building SC modules or revising a connection such that the load distribution is dramatically changed, thereby adversely affecting the dynamic behavior of the shield building would require prior NRC approval.

Changes to Enclosure 3:

To address the concerns addressed by the NRC staff in the question, SNC agrees to broaden the scope of proposed evaluation Criterion 1 to address additional requirements. Proposed Criterion 1 is revised to address RC design, SC module design, and shield building design as follows:

1(a) Involve design methodology or structural ~~construction~~ materials that deviate from a code or standard credited in the plant-specific DCD for establishing the criteria for the design or construction of a structure, system, or component (SSC) important to safety; deviate from the design methodology described in UFSAR Subsection 3.8.7, Reference 57; deviate from Tier 2* supplemental design

requirements described in UFSAR Subsections 3.8.4.5.1, 3.8.4.5.2, 3.8.4.5.5, or 3H.3.4;

1(b) Result in the ratio of required reinforcement to provided reinforcement across the area of a critical section structural member, calculated per design analysis demand and actual provided area of steel values, exceeding that ratio value stated in or calculated from UFSAR Section 3.8 and Appendix 3H Tables Tier 2* values for the applicable structural member; or

1(c) Result in changes to SC module walls in the Nuclear Island or Shield Building, Shield Building SC-to-RC connections, or Shield Building RC regions that adversely affect the strength, stiffness, ductility, or dynamic response of an element.

Similar conforming changes are also applicable to Enclosures 1, 4, and 5 of the original LAR-17-037.