**From:** Habib, Donald
**Sent:** Tuesday, November 12, 2019 9:10 AM
**To:** Vogtle PEmails
**Subject:** FW: Draft LAR-19-017 and Request for Public Meeting
**Attachments:** LAR-19-017 SUPPLEMENT 1 PRHR HX Nat Circ DRAFT 11.11.19 NP.pdf

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**From:** Kellenberger, Nicholas <X2NRKELL@SOUTHERNCO.COM>
**Sent:** Tuesday, November 12, 2019 8:50 AM
**To:** Habib, Donald <Donald.Habib@nrc.gov>
**Cc:** Patel, Chandu <Chandu.Patel@nrc.gov>; Santos, Cayetano <Cayetano.Santos@nrc.gov>; Roberts, Kelli Anne <KROBERTS@southernco.com>; Meneely, Jennifer E <meneelje@westinghouse.com>
**Subject:** [External_Sender] Draft LAR-19-017 and Request for Public Meeting

Don,

Attached please find a non-proprietary version of our Draft LAR supplement for LAR 19-017 on PRHR HX testing. The updated supporting Westinghouse document, APP-FSAR-GLN-1118, has been uploaded to the ERR to support any discussion of proprietary information. You can find that document here:

We would like to propose having a public meeting to discuss the attached draft on November 21st. Our Westinghouse support will be in another meeting at the NRC at 9 am so we would propose that this discussion take place at 11 am.

Please let me know if you have any questions.

Thanks,

Nick Kellenberger
Vogtle 3 and 4 Site Licensing
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**Southern Nuclear Operating Company**

**ND-19-XXXX**

**Enclosure X**

**Vogtle Electric Generating Plant (VEGP) Units 3 and 4**

**Request for License Amendment:**

**Removal of the Preoperational Passive Residual Heat Removal Heat Exchanger Natural Circulation Test**

**(LAR-19-017S1)**

**(This Enclosure consists of 12 pages, including this cover page)**

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Pursuant to 10 CFR 52.98(c) and in accordance with 10 CFR 50.90, Southern Nuclear Operating Company (SNC, or the "Licensee") hereby requests an amendment to Combined License (COL) Nos. NPF-91 and NPF-92 for Vogtle Electric Generating Plant (VEGP) Units 3 and 4, respectively.

## 1. SUMMARY DESCRIPTION

The requested amendment proposes to remove the preoperational passive residual heat removal (PRHR) heat exchanger natural circulation test from the scope of the VEGP Units 3 and 4 Initial Test Program (ITP). The proposed changes would revise licensing basis documents, including the Updated Final Safety Analyses Report (UFSAR) Subsections 1.9.4.2.1, 3.9.1.1.1.17, 6.3.6.1.2, and 14.2.9.1.3. In addition, COL Appendix C (and plant-specific Tier 1) Inspections, Tests, Analyses and Acceptance Criteria (ITAAC) 2.2.03.08b.01 (No. 175) will be revised to replace the PRHR heat exchanger natural circulation test with the PRHR heat exchanger forced flow test, which is described in UFSAR 14.2.9.1.3.

The requested amendment requires changes to the UFSAR in the form of departures from the plant-specific Design Control Document (DCD) Tier 2 information (as detailed in Section 2) and involves changes to COL Appendix C (and corresponding plant-specific Tier 1). This enclosure requests approval of the license amendment necessary to implement the COL Appendix C changes and the involved UFSAR changes. Enclosure 3 requests the exemption necessary to implement the involved changes to the plant-specific Tier 1 information.

## 2. DETAILED DESCRIPTION and TECHNICAL EVALUATION

The ITP is implemented in two phases, categorized as preoperational and startup testing. As described in UFSAR Section 14.2, the objectives of preoperational testing include demonstrating that the plant has been constructed as designed and that the systems perform consistent with plant design. Preoperational testing of the Passive Core Cooling System (PXS) is described in UFSAR subsection 14.2.9.1.3. The purpose of this testing is to verify that the as-installed components perform the safety functions described in UFSAR Section 6.3. One safety function of the PXS is emergency core decay heat removal.

UFSAR Subsection 14.2.9.1.3 currently requires three preoperational tests to verify the PXS emergency core decay heat removal function through testing of the PRHR heat exchanger; these tests are described here in the order they appear in the UFSAR. During hot functional testing of the reactor coolant system (RCS), the temperature of the PRHR heat exchanger's supply and return lines are recorded to verify natural circulation flow will initiate (i.e., 14.2.9.1.3 Item (e)). Secondly, the heat transfer capability of the PRHR heat exchanger will be verified by measuring the natural circulation flow rate and the heat exchanger inlet and outlet temperatures while the RCS is cooled to ≤ 420°F (i.e., 14.2.9.1.3 Item (f)). This testing will be performed during hot functional testing with the RCS initial temperature ≥ 540°F and the reactor coolant pumps not running. Lastly, proper operation of the passive residual heat removal heat exchanger and its heat transfer capability will be verified by initiating and operating the PRHR heat exchanger with all four reactor coolant pumps running (i.e., 14.2.9.1.3 Item (g)). This testing will be performed during hot functional testing with the RCS at an elevated initial temperature ≥ 350°F. The heat exchanger heat transfer is determined by measuring the heat exchanger flow rate and its inlet and outlet temperatures while the RCS is cooled to ≤ 250°F.

UFSAR Subsection 14.2.9.1.3 Item (f), the preoperational PRHR heat exchanger (i.e., HX) natural circulation test, is also required by ITAAC 2.2.03.08b.01. [

]$^{(a,c)}$

The requested amendment proposes to remove the preoperational PRHR heat exchanger natural circulation test from the scope of the VEGP Units 3 and 4 ITP and revise ITAAC 2.2.03.08b.01 to perform the heat removal performance test of the PRHR heat exchanger under forced flow conditions. The proposed change is not adverse as ~~additional~~the following methods are available to demonstrate the PRHR heat exchanger will perform its design and license bases functions under natural circulation conditions. These methods include completion of ITAAC in COL Appendix C, Table 2.2.3-4, and completion of the preoperational tests described in UFSAR Subsection 14.2.9.1.3 Items (a), (e), and (g). ITAAC related to the PRHR heat exchanger design requirements and the PXS design functionality will confirm that the design of the PRHR heat exchanger and PXS meets the AP1000 standard design as described in the UFSAR. The preoperational tests defined in UFSAR Subsection 14.2.9.1.3 Items (e) and (g) will confirm that the PRHR heat exchanger can remove heat by verifying natural circulation flow can initiate and by confirming proper operation and heat transfer capability of the heat exchanger during a forced flow test, respectively. ITAAC 2.2.03.08b.01 will be revised to perform the PRHR heat exchanger forced flow test described in UFSAR Subsection 14.2.9.1.3 Item (g).

Table 1 demonstrates how each of the parameters related to initiation of natural circulation are verified during the construction process, including; PRHR HX construction, inlet and outlet line sloping, valve testing, inlet and outlet temperature measurements, and hydraulic resistance.

Table 1: PRHR Parameters

| | Design | As-Built | |
|---|---|---|---|
| Parameter | Value | Value | Reference |
| PRHR inlet line design and sloping requirements | RCS-L134<br>PXS-L102 | ITAAC 2.2.03.02a (Index No. 159)<br>RCS-L134<br>PXS-L102 | Closure of ITAAC |
| PRHR outlet line design and sloping requirements | PXS-L103<br>PXS-L104A/B<br>PXS-L105<br>RCS-L113 | ITAAC 2.2.03.02a (Index No. 159)<br>PXS-L103<br>PXS-L104A/B<br>PXS-L105<br>RCS-L113 | Closure of ITAAC |
| PRHR HX Inlet Temperature | > 400_F | Measured during UFSAR 14.2.9.1.3 item e) test | Performance of preoperational test |
| PRHR Outlet Temperature | < 220F | Measured during UFSAR 14.2.9.1.3 item e) test | Performance of preoperational test |

| Table 1: PRHR Parameters | | | |
|---|---|---|---|
| | Design | As-Built | |
| Parameter | Value | Value | Reference |
| Hydraulic resistance | The calculated flow resistance is ≤ 3.085E-06 ft/ $gpm^2$ | Test report after UFSAR 14.2.9.1.3 g) test is performed. | Calculation |
| PRHR inlet valve Requirement (PXS-PL-V101) | Valve normally open, no actuation required for PRHR HX operation | ASME Requirements: ITAAC 2.2.03.02a (Index No. 159) Seismic Requirements: ITAAC 2.2.03.05a.i (Index No. 165) 1E Requirements: ITAAC 2.2.03.07b (Index No. 172) MCR Requirements ITAAC 2.2.03.10 (Index No. 206) ITAAC 2.2.03.11a.i (Index No. 207) PMS Requirements ITAAC 2.2.03.11b.i (Index No. 209) DAS Requirements ITAAC 2.2.03.11c.i (Index No. 212) ITAAC 2.2.03.11c.ii (Index No. 213) Testing Requirements: UFSAR 14.2.9.1.3 a) | Closure of ITAAC and performance of associated preoperational tests |

| Table 1: PRHR Parameters | | | |
|---|---|---|---|
| | Design | As-Built | |
| Parameter | Value | Value | Reference |
| PRHR outlet valve Requirement (PXS-PLV108A/ B) | Valve normally closed, actuation to open required for PRHR HX operation | ASME Requirements: ITAAC 2.2.03.02a (Index No. 159)<br>Seismic Requirements: ITAAC 2.2.03.05a.i (Index No. 165)<br>1E Requirements: ITAAC 2.2.03.07b (Index No. 172)<br>MCR Requirements ITAAC 2.2.03.10 (Index No. 206)<br>ITAAC 2.2.03.11a.i (Index No. 207)<br>PMS Requirements ITAAC 2.2.03.11b.i (Index No. 209)<br>DAS Requirements ITAAC 2.2.03.11c.i (Index No. 212)<br>ITAAC 2.2.03.11c.ii (index No. 213)<br>Testing Requirements: UFSAR 14.2.9.1.3 a) | Closure of ITAAC and performance of associated preoperational tests |
| PRHR HX elevation | The elevation of the centerline of the HX's upper channel head is greater than the HL centerline by at least 26.3 ft (8.0 m) | ITAAC 2.2.03.08b.02 (Index No. 176) | Closure of ITAAC |
| PRHR HX (PXS-ME-01) | ASME, Seismic | ASME Requirements: ITAAC 2.2.03.02a (Index No. 159)<br>Seismic Requirements: ITAAC 2.2.03.05a.i (Index No. 165) | Closure of ITAAC |
| PRHR tube diameter | To be added in LAR | | |

In addition, actuation of the PRHR HX and initiation of natural circulation flow through the AP1000 reactor coolant system (RCS) requires that the PRHR HX outlet air operated valves (AOVs) (PXS-PLV108A/ B) transfer open. The AOVs are designed to fail open. No additional equipment is needed to initiate PRHR HX operation; there are no pumps involves, no diesel generators involved, no transfer from auxiliary power required, and no special instrumentation and controls

sequencing or tuning is required. The simplicity of the design provides reasonable assurance that natural circulation will initiate when required.

ITAAC in COL Appendix C, Table 2.2.3-4, require components in the PXS, including those involved in the PRHR heat exchanger testing and related structures, systems, and components (SSCs), to be evaluated prior to operation. The ITAAC include construction, design, and testing requirements. ITAAC 2.2.03.02a requires the PRHR heat exchanger and associated components, including the inlet isolation valve and the control valves, meet ASME Code Section III requirements. ITAAC 2.2.03.05a.i requires the PRHR heat exchanger and associated components meet seismic Category 1 requirements. ITAAC 2.2.03.08b.02 requires that the PXS provides core decay heat removal during design basis events by confirming the elevation of the centerline of the heat exchanger's upper channel head is greater than the hot leg centerline by 26.3 feet. Confirmation of this physical configuration provides assurance that natural circulation flow will work as designed, when initiated. Completion of the ITAAC listed above will verify that the PRHR heat exchanger and related PXS SSCs were installed at VEGP Units 3 and 4 according to the standard plant AP1000 design as described in the VEGP Units 3 and 4 UFSAR and that the PRHR heat exchanger will perform its safety-related design function.

UFSAR Subsection 14.2.9.1.3 Item (e) requires that the PRHR heat exchanger supply and return line piping water temperatures be recorded, during hot functional testing of the RCS, to verify that natural circulation flow can be initiated. This test will demonstrate that the temperature measured at the inlet of the PRHR heat exchanger is higher than the temperature measured in the return line. The temperature difference between the supply and return lines, in combination with the elevation difference between those lines as required by ITAAC 2.2.03.08b.02, will demonstrate that natural circulation flow can be initiated. This preoperational test will confirm that the PRHR heat exchanger can meet its design requirement to initiate natural circulation flow.

UFSAR Subsection 14.2.9.1.3 Item (g) (and described in proposed ITAAC 2.2.03.08b.01) requires that proper operation of the PRHR heat exchanger and its heat transfer capability be demonstrated by conducting a forced flow test. During hot functional testing, with the RCS at an elevated initial temperature ≥ 350°F, the PRHR heat exchanger heat transfer capability is verified by initiating and operating the heat exchanger with all four reactor coolant pumps running at a reduced speed. The heat exchanger heat transfer rate is determined by measuring the heat exchanger flow rate and its inlet and outlet temperatures while the RCS is cooled to ≤ 250°F. This preoperational test will confirm that the PRHR heat exchanger, as a component, meets its design requirement to transfer core-generated heat to the in-containment refueling water storage tank. The heat removal performance test of the PRHR heat exchanger under forced flow conditions will replace the PRHR heat exchanger natural circulation test in ITAAC 2.2.03.08b.01.

The replacement of the natural circulation test ITAAC (current ITAAC 2.2.03.08b.01, UFSAR Subsection 14.2.9.1.3 item (f)) with the forced flow test (proposed ITAAC 2.2.03.08b.01 in Enclosure Y) is acceptable from a construction and testing perspective. The terms "natural circulation" and "forced flow," when applied to the PRHR heat exchanger tests, describe the flow driving mechanism, not the heat transfer phenomenon. The heat transfer mechanism in the PRHR heat exchanger is forced convection for both tests. The differences in the flow driving mechanism (forced flow versus natural circulation flow) do not provide additional insight beyond what can be obtained by the performance of one test, with respect to flow rate or heat transfer performance. The forced flow test appropriately measures the heat transfer of the as-installed PRHR heat exchanger at elevated temperatures, providing confirmation that the design and construction

requirements of the PRHR heat exchanger are met. Any potential construction issues that impact flow rates or PRHR heat exchanger performance would become apparent during performance of the forced flow test. The nature of the flow driving mechanism (i.e. pump or natural circulation) does not impact the ability to detect construction issues.

[



] (a,c)

UFSAR Appendix 1A discusses conformance with US NRC Regulatory Guides (RGs). RG 1.68, *Initial Test Program for Water-Cooled Nuclear Power Plants*, describes the general scope and depth that the NRC considers acceptable for demonstrating compliance with NRC regulations as they pertain to the ITP; the AP1000 design has conformance statements for Revisions 2 and 3. The AP1000 design conformance statement for Appendix A.4.t of the RG discusses how the requirements are met, including; "… provisions to perform the pre-operational tests of the passive RHR heat exchanger…" The requirement and compliance statement will be met by the remaining PRHR heat exchanger preoperational tests. The physical aspects required to initiate natural circulation flow are confirmed by the preoperational test described in UFSAR Subsection 14.2.9.1.3 Item (e) in combination with the elevation difference between those lines as required by ITAAC 2.2.03.08b.02. The heat transfer capability of the PRHR heat exchanger is confirmed by the preoperational test described in UFSAR Section 14.2.9.1.3 Item (g). In the AP600 Final

Safety Evaluation Report (FSER), the NRC staff confirmed that the exception to RG 1.68 was acceptable provided that the training requirements (described in UFSAR Subsection 1.9.4.2.1, *TMI Action Plan Issues*, under I.G.1, *Training Requirements*) are met and that Westinghouse demonstrates that all plants remain identical in physical layout and configuration of the proposed plant key components, and validate that acceptance criteria for the ranges of values for other system flow performance measurements that are taken during the ITP confirm that the overall flow characteristics of the proposed plant are equivalent to the reference plant. Demonstrations of the layout of primary components as well as flow measurements are confirmed during the ITAAC closure process and preoperational testing. Therefore, conformance with the RG requirements as described by the NRC staff in the AP600 FSER is maintained without performance of the preoperational PRHR heat exchanger natural circulation test.

UFSAR Subsection 3.9.1.1.1 lists the RCS transients which are considered normal operating transients and analyzed using Level A service limits (i.e., tests which do not require a pressure which is greater than the component design pressure). One of these transients, the PRHR test, is described in UFSAR Subsection 3.9.1.1.1.17. This subsection is proposed to be revised as the transient caused by the preoperational PRHR heat exchanger natural circulation test will be removed. The transient analysis as described in UFSAR Subsection 3.9.1.1 is not changed and no PRHR heat exchanger operational fatigue cycles, as described in UFSAR Table 3.9-1, are removed. This modification is made so that the description of the fatigue analyses is consistent with the tests performed.

In summary, the requested amendment proposes to remove the preoperational PRHR heat exchanger natural circulation test from the scope of the ITP. As a result, ITAAC 2.2.03.08b.01, which currently requires performance of that test, will be revised to perform the heat removal performance test of the PRHR heat exchanger under forced flow conditions. The license bases changes associated with this request are not adverse as other methods, including preoperational tests and ITAAC, are available to confirm that the PRHR heat exchanger will perform its design and license bases functions.



**Licensing Bases Changes**

COL Appendix C, Subsection 2.2.3, Table 2.2.3-4
ITAAC 2.2.03.08b.01 is proposed to be revised to reflect that the heat removal performance test and analysis of the PRHR heat exchanger will be conducted under forced flow conditions. Information in the Inspections Test and Analyses column and the Acceptance Criteria column will be revised to reflect forced flow test, consistent with the description in UFSAR 14.2.9.1.3 Item (g).

UFSAR 1.9.4.2.1, Subsection I.G.1
References to the performance of the preoperational PRHR heat exchanger natural circulation test are proposed to be removed from this section; removed information includes the reference to training information obtained during the natural circulation test. In accordance with UFSAR 1.9.4.2.1, Subsection I.G.1, Item 6, data from the first plant only natural circulation tests is provided for operator training on plant simulator; this requirement remains unchanged. Also, natural circulation is included in the continuing training program for operators; this training is sufficient to ensure Operators are trained to respond appropriately.

UFSAR 3.9.1.1.1.17
The section is proposed to be revised to reflect that the heat removal test is conducted during the ITP. In addition, this section is proposed to be updated to remove references to cooling the reactor coolant system for thirty minutes; instead this section will specify that the temperature and pressure responses to the testing are based on a conservative definition of the test conditions with a total of 5 occurrences. The transient analysis as described in UFSAR Subsection 3.9.1.1 is not changed and no PRHR heat exchanger operational fatigue cycles, as described in UFSAR Table 3.9-1, are removed. This modification is made so that the description of the fatigue analyses is consistent with the tests performed.

UFSAR 6.3.6.1.2
The reference to 'natural circulation' is proposed to be replaced with 'forced flow.' In addition, section will point to UFSAR Subsection 14.2.9.1.3 Item (g) for a description of the test performance.

UFSAR 14.2.9.1.3
The section is proposed to be revised to update Item (e) to reflect that temperatures are recorded to verify that natural circulation flow can initiate. ~~In addition,~~ Item (f), which discusses the preoperational PRHR heat exchanger natural circulation test, is proposed to be reworded to reflect it is not used. In addition, Item (g) is revised to include the measurement of line resistance of the PRHR subsystem.

## 3. TECHNICAL EVALUATION (Included in Section 2)

## 4. REGULATORY EVALUATION

### 4.1 Applicable Regulatory Requirements/Criteria

10 CFR 52.98(c) requires an amendment to the license for any modification to, addition to, or deletion from the terms and conditions of a combined license, including modification to, addition to, or deletion from the ITAAC contained in the license. The proposed changes involve changes to UFSAR Appendix 1A and Subsections 3.9.1.1.1, 6.3.6.1.2, and 14.2.9.1.3 which require a revision to the COL Appendix C ITAAC. Therefore, approval of the license amendment request (LAR) (as supplied herein) is required prior to implementing the plant-specific changes in this request.

10 CFR 52, Appendix D, Section VIII.B.5.a allows an applicant or licensee who references this appendix to depart from Tier 2 information, without prior NRC approval, unless the proposed departure involves a change to or departure from Tier 1 information, Tier 2* information which is not exempt under License Condition 2.D.(13)(a) of the COL, or the Technical Specifications, or requires a license amendment under paragraphs B.5.b or B.5.c of the section. The proposed change to remove the preoperational PRHR heat exchanger natural circulation test from the scope of the ITP includes a change to Tier 1 information. Therefore, NRC approval is required for the departure.

10 CFR 50, Appendix A, General Design Criterion (GDC) 1, requires that SSCs important to safety be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed. The proposed change involves removing the preoperational PRHR heat exchanger natural circulation test from the scope of the ITP. The proposed change does not alter the design or an analysis of the PRHR heat exchanger; other

tests within the ITP will assess the ability of the PRHR heat exchanger to perform its safety function. In addition, ITAAC will continue to demonstrate the PRHR heat exchanger heat removal performance. Therefore, the proposed changes comply with the requirements of GDC 1.

10 CFR 50, Appendix A, GDC 34, requires residual heat to be removed from the plant. The safety function of the PRHR system is to transfer fission product decay heat and other residual heat from the reactor core at a rate such that specified acceptable fuel design limits and the design conditions of the reactor coolant pressure boundary are not exceeded. The proposed change involves removing the preoperational PRHR heat exchanger natural circulation test from the scope of the ITP. The PRHR heat exchanger design and its ability to adequately transfer heat is unchanged. Remaining tests will demonstrate the heat removal capabilities of the PRHR heat exchanger. Therefore, the proposed changes comply with the requirements of GDC 34.

10 CFR 50, Appendix A, GDC 35 requires a system to provide abundant emergency core cooling be provided. The system safety function shall be to transfer heat from the reactor core following any loss of reactor coolant at a rate such that (1) fuel and clad damage that could interfere with continued effective core cooling is prevented and (2) clad metal-water reaction is limited to negligible amounts. The proposed changes to remove the preoperational PRHR heat exchanger natural circulation test from the scope of the ITP do not include changes to any physical design feature or function described in the UFSAR. ITAAC will continue to demonstrate the PRHR heat exchanger heat removal performance. Therefore, the proposed change complies with the requirements of GDC 35.

10 CFR 50, Appendix A, GDC 36 requires that the emergency core cooling system be designed to permit appropriate periodic inspection of important components to assure the integrity and capability of the system. The proposed changes to remove the preoperational PRHR heat exchanger natural circulation test from the scope of the ITP and to revise ITAAC do not include physical changes to any component. Therefore, the proposed changes do not adversely affect the capability to perform appropriate inspections and comply with the requirements of GDC 36.

10 CFR 50, Appendix A, GDC 37 requires that the emergency core cooling system be designed to permit appropriate periodic pressure and functional testing to assure (1) the structural and leak tight integrity of its components, (2) the operability and performance of the active components of the system, and (3) the operability of the system as a whole and, under conditions as close to design as practical, the performance of the full operational sequence that brings the system into operation, including operation of applicable portions of the protection system, the transfer between normal and emergency power sources, and the operation of the associated cooling water system. The proposed changes to remove the preoperational PRHR heat exchanger natural circulation test from the scope of the ITP and revise ITAAC which demonstrates the heat removal capability of the PRHR heat exchanger do not include changes to any physical design feature or function as described in the UFSAR. Therefore, the proposed changes comply with the requirements of GDC 37.

Regulatory Guide 1.68 describes the ITP requirements. The proposed changes to remove the preoperational PRHR heat exchanger natural circulation test from the scope of the ITP and revise ITAAC which demonstrates the heat removal capability of the PRHR heat exchanger do not alter compliance with RG 1.68. The PRHR heat exchanger will be tested in accordance with Sections A-1.d, *Residual or Decay Heat Removal Systems,* and A-1.h, *Engineered Safety Functions,* of RG 1.68. The proposed changes do not adversely impact the UFSAR in terms of conformance with RG 1.68.

The proposed changes have been reviewed to confirm that all applicable regulations will be met. It was determined that the proposed changes do not affect conformance with the General Design Criteria or the intent of RG 1.68 as described in the plant-specific DCD or UFSAR.

### 4.2 Precedent

None

### 4.3 Significant Hazards Consideration

The proposed amendment involves removing the preoperational PRHR heat exchanger natural circulation test from the scope of the VEGP Units 3 and 4 ITP and revising ITAAC which demonstrates the heat removal capability of the PRHR heat exchanger. The request requires changes to the UFSAR in the form of departures from the plant-specific DCD Tier 2 information and related changes to the VEGP Units 3 and 4 COL Appendix C (and corresponding plant-specific Tier 1) information.

An evaluation to determine whether or not a significant hazards consideration is involved with the proposed amendment was completed by focusing on the three standards set forth in 10 CFR 50.92, “Issuance of Amendment,” as discussed below.

#### 4.3.1 Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No

The proposed changes do not affect the operation of any systems or equipment that initiates an analyzed accident or alter any SSC accident initiator or initiating sequence of events. The proposed changes remove the requirement to perform the preoperational PRHR heat exchanger natural circulation test and revise ITAAC which demonstrates the heat removal capability of the PRHR heat exchanger. The remaining preoperational testing and ITAAC will confirm the PRHR heat exchanger can perform its design and licensing bases functions. The changes do not adversely affect any methodology which would increase the probability or consequences of a previously evaluated accident.

The changes do not impact the support, design, or operation of mechanical or fluid systems. There is no change to plant systems or the response of systems to postulated accident conditions. There is no change to predicted radioactive releases due to normal operation or postulated accident conditions. The plant response to previously evaluated accidents or external events is not adversely affected, nor does the proposed change create any new accident precursors.

Therefore, the proposed amendment does not involve a significant increase in the probability or consequences of a previously evaluated accident.

### 4.3.2 Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No

The proposed changes do not affect the operation of any systems or equipment that may initiate a new or different kind of accident, or alter any SSC such that a new accident initiator or initiating sequence of events is created.

The proposed changes remove the requirement to perform the preoperational PRHR heat exchanger natural circulation test and revise ITAAC related to the PRHR heat exchanger. The remaining tests will demonstrate the heat removal capabilities of the PRHR heat exchanger. The remaining preoperational testing and ITAAC will confirm the PRHR heat exchanger can perform its design and licensing bases functions. The proposed changes do not adversely affect any design function of any SSC design functions or methods of operation in a manner that results in a new failure mode, malfunction, or sequence of events that affect safety-related or non-safety-related equipment. This activity does not allow for a new fission product release path, result in a new fission product barrier failure mode, or create a new sequence of events that result in significant fuel cladding failures.

Therefore, the proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated.

### 4.3.3 Does the proposed amendment involve a significant reduction in a margin of safety?

Response: No

The proposed changes maintain the existing safety margin and provide adequate protection through continued application of the existing requirements in the UFSAR. The proposed changes satisfy the same design functions in accordance with the same codes and standards as stated in the UFSAR. The changes do not adversely affect any design code, function, design analysis, safety analysis input or result, or design/safety margin. No safety analysis or design basis acceptance limit/criterion is challenged or exceeded by the proposed change.

Since no safety analysis or design basis acceptance limit/criterion is changed, the margin of safety is not reduced.

Therefore, the proposed changes do not involve a significant reduction in a margin of safety.

Based on the above, it is concluded that the proposed amendment does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of “no significant hazards consideration” is justified.

## 4.4 Conclusions

This assessment addresses the considerations discussed above. The plant licensing basis, safety analyses, and design bases evaluations demonstrate that the requested changes are accommodated without an increase in the probability or consequences of an accident previously evaluated, without creating the possibility of a new or different kind of accident from any accident

previously evaluated, and without a significant reduction in the margin of safety. In conclusion, based on the considerations discussed above, (1) there is a reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public. Having arrived at negative declarations with regard to the criteria of 10 CFR 50.92, this assessment determined that the requested changes do not involve a Significant Hazards Consideration.

## 5. ENVIRONMENTAL CONSIDERATIONS

An amendment to current licensing basis documents is requested to remove the preoperational PRHR heat exchanger natural circulation test from the scope of the initial test program and revise ITAAC which demonstrates the heat removal capability of the PRHR heat exchanger. Section 2 of this license amendment request provides the details of the proposed change.

This review supports the request to amend the Updated Final Safety Analysis Report (UFSAR) in the form of departures from the plant-specific Design Control Document (DCD) Tier 2 information and revise related plant-specific Tier 1 information with associated changes to Combined License (COL) Appendix C information. The Licensee has determined that the anticipated construction and operational effects of the proposed amendment meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9), in that:

*(i) There is no significant hazards consideration.*

As documented in Section 4.3, *Significant Hazards Consideration*, of this license amendment request, an evaluation was completed to determine whether or not a significant hazards consideration is involved by focusing on the three standards set forth in 10 CFR 50.92, *Issuance of Amendment*. The significant hazards consideration determined that (1) the requested amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated; (2) the requested amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated; and (3) the requested amendment does not involve a significant reduction in a margin of safety. Therefore, it is concluded that the requested amendment does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and accordingly, a finding of "no significant hazards consideration" is justified.

*(ii) There is no significant change in the types or significant increase in the amounts of any effluents that may be released offsite.*

The proposed changes are unrelated to any aspect of plant construction or operation that would introduce any change to effluent type (e.g., effluents containing chemicals or biocides, sanitary systems effluents, and other effluents), or affect any plant radiological or non-radiological effluent release quantities. Furthermore, the proposed changes do not affect any effluent release path or diminish the design function or operational features that are credited with controlling the release of effluents during plant operation. Therefore, it is concluded that the requested amendment does not involve a significant change in the types or a significant increase on the amounts of any effluents that may be released offsite.

*(iii) There is no significant increase in individual or cumulative occupational radiation exposure.*

The proposed changes do not adversely affect walls, floors, or other structures that provide shielding. Plant radiation zones are not affected, and there are no changes to the controls required under 10 CFR Part 20 that preclude a significant increase in occupational radiation exposure. Therefore, the requested amendment does not involve a significant increase in individual or cumulative occupational radiation exposure.

Based on the above review of the requested amendment, it has been determined that the anticipated construction and operational impacts of the requested amendment do not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, and (iii) a significant increase in the individual or cumulative occupational radiation exposure. Accordingly, the requested amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection the requested amendment.

## 6. REFERENCES

None

**Southern Nuclear Operating Company**

**ND-19-XXXX**

**Enclosure Y**

**Vogtle Electric Generating Plant (VEGP) Units 3 and 4**

**Proposed Changes to the Licensing Basis Documents**

**(LAR-19-017S1)**



**Note:**

Added text is shown as Blue Underline

Deleted text is shown as ~~Red Strikethrough~~

Omitted text is shown as three asterisks (*...*...*)

(This Enclosure consists of 4 pages, including this cover page)

## COL Appendix C Changes

**COL Appendix C, Subsection 2.2.3, Table 2.2.3-4 – Revise ITAAC 2.2.03.08b.01 as shown below.**

Table 2.2.3-4
Inspections, Tests, Analyses, and Acceptance Criteria

| No. | ITAAC No. | Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
|---|---|---|---|---|
| *** | | | | |
| 175 | 2.2.03.08b.01 | 8.b) The PXS provides core decay heat removal during design basis events. | 1. A heat removal performance test and analysis of the PRHR HX will be performed to determine the heat transfer from the HX. For the test, the reactor coolant hot leg temperature will be initially at ≥ ~~540~~ 350°F with the reactor coolant pumps ~~stopped~~ running. The IRWST water level for the test will be above the top of the HX. ~~The IRWST water temperature is not specified for the test.~~ The test will continue until the hot leg temperature ~~decreases below 420~~ is ≤ 250°F. | 1. A report exists and concludes that the PRHR HX heat transfer rate with the design basis number of PRHR HX tubes plugged is: ≥ ~~$1.78 \times 10^8$~~ $8.46 \times 10^7$ Btu/hr with ~~520~~ 250°F HL Temp and ~~80°F~~ an initial IRWST temperature~~s~~ of 80°F. ≥ ~~$1.11 \times 10^8$ Btu/hr with 420°F HL Temp and 80°F IRWST temperatures.~~ The heat transfer rate measured in the test should be adjusted to account for differences in the HL and IRWST temperatures and the number of tubes plugged. |
| *** | | | | |



## UFSAR Changes

**UFSAR Subsection 1.9.4.2.1, *TMI Action Plan Issues*, Revise text as shown below.**

* * *

### I.G.1 Training Requirements

**Discussion:**

Item I.G.1 included the issue of natural circulation testing for use as input into operator training.

**AP1000 Response:**

For the AP1000, natural circulation heat removal using the steam generators is not safety-related, as in current plants. This safety-related function is performed by the passive residual heat removal system. ~~Natural circulation heat removal via the passive residual heat removal heat exchanger is tested for every plant during hot functional testing. This testing of~~ Testing of the passive residual heat removal system meets the intent of the requirement to perform natural circulation testing and the results of this testing is factored into the operator training.

For the AP1000, the tests outlined below are contained in the AP1000 initial test plan and demonstrate the effectiveness of natural circulation cooling.

1. Not Used. ~~During hot functional testing, prior to fuel load, with the reactor coolant pumps not running and offsite power not being used for heat removal, the heat removal capability of the passive residual heat removal heat exchanger with natural circulation flow is verified (See Subsection 14.2.9.1.3, item e).~~

* * *

6. Data obtained from the first plant only natural circulation tests using the steam generators and PRHR is provided for operator training on a plant simulator at the earliest opportunity. ~~Operating training for subsequent plants is also obtained while performing the hot functional PRHR natural circulation test described in item 1 above.~~

* * *

**UFSAR Subsection 3.9.1.1.1.17, *Passive Residual Heat Removal Test*, revise as shown below.**

During the initial test program ~~hot functional testing with the reactor coolant system in hot standby condition~~, the passive residual heat removal flow and heat transfer rates are tested. Passive residual heat removal flow is initiated by opening the passive residual heat removal isolation valves. ~~The passive residual heat removal cools the reactor coolant system for up to 30 minutes.~~ For component design purposes, the temperature and pressure responses to this testing are based on a conservative definition of the test conditions with a total of 5 occurrences.

**UFSAR Subsection 6.3.6.1.2, *Heat Transfer Testing*, revise as shown below.**

Initial verification of the heat transfer capability of the passive residual heat removal heat exchanger is performed by conducting a forced flow ~~natural circulation~~ test. This test is conducted during hot functional testing of the reactor coolant system and performed as described in Subsection 14.2.9.1.3 item g). ~~Measurements of heat exchanger flow rate and inlet and outlet temperatures are recorded, and calculations are performed to verify that the heat transfer performance of the heat exchanger is greater than that provided in Table 6.3-2.~~

**UFSAR Subsection 14.2.9.1.3, *Passive Core Cooling System Testing*, revise as shown below.**

* * *

The passive core cooling system emergency core decay heat removal function is verified by the following testing of the passive residual heat removal heat exchanger.

e) During hot functional testing of the reactor coolant system, the heat exchanger supply and return line piping water temperatures are recorded to verify that natural circulation flow ~~initiates~~ can initiate. The measured supply line temperature is >400ºF and the measured return line temperature is <220ºF.

f) Not used. ~~The heat transfer capability of the passive residual heat removal heat exchanger is verified by measuring natural circulation flow rate and the heat exchanger inlet and outlet temperatures while the reactor coolant system is cooled to ≤ 420°F. This testing is performed during hot functional testing with the reactor coolant system initial temperature ≥ 540°F and the reactor coolant pumps not running. The acceptance criteria for the PRHR HX heat transfer under natural circulation conditions are that the heat transfer rate is > 1.78 E+08 Btu/hr based on a 520°F hot leg temperature and ≥ 1.11 E+08 Btu/hr based on 420°F hot leg temperature with 80°F IRWST temperature and the design number of tubes plugged. These plant conditions are selected to be close to the expected test conditions and are different than those listed in Table 6.3-2. The PRHR HX heat transfer rate has been adjusted to account for these different conditions. The heat transfer rate measured in the test should be adjusted to account for differences in the hot leg and IRWST temperatures and number of tubes plugged.~~

g) The proper operation of the passive residual heat removal heat exchanger and its heat transfer capability with forced flow is verified by initiating and operating the heat exchanger with all four reactor coolant pumps running. This testing is performed during hot functional testing with the reactor coolant system at an elevated initial temperature > 350°F. The heat exchanger heat transfer is determined by measuring the heat exchanger flow rate and its inlet and outlet temperatures while the reactor coolant system is cooled to < 250°F. The acceptance criteria for the PRHR HX heat transfer under forced circulation conditions are listed in Table 3.9-17. The heat transfer rate measured in the test should be adjusted to account for differences in the hot leg and IRWST temperatures and number of tubes plugged. The line resistance of the PRHR subsystem is measured. The flow rate and the differential pressure across the PRHR subsystem are used to determine the resistance of the PRHR subsystem. The acceptance criterion for the resistance of the line is ≤ 3.085E-06 ft/gpm2.



* * *