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ND-20-0092
10 CFR 50.90
10 CFR 52.63

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Southern Nuclear Operating Company
Vogtle Electric Generating Plant Units 3 and 4
Revision to Request for License Amendment:
Removal of the Preoperational Passive Residual Heat Removal Heat Exchanger
Natural Circulation Test (LAR-19-017R1)

Ladies and Gentlemen:

Pursuant to 10 CFR 52.98(c) and in accordance with 10 CFR 50.90, Southern Nuclear Operating Company (SNC), the licensee for Vogtle Electric Generating Plant (VEGP) Units 3 and 4, requested an amendment to Combined License Numbers NPF-91 and NPF-92, for VEGP Units 3 and 4, respectively, by SNC Letter ND-19-0947, dated September 6, 2019 [ADAMS Accession No. ML19249C738].

The requested amendment included a change to remove the natural circulation test of the passive residual heat removal (PRHR) heat exchanger, which is conducted during preoperational testing, from the scope of the initial test program. In lieu of performing this test according to Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) 2.2.03.08b.01, the ITAAC is updated to reflect the heat removal performance test of the PRHR heat exchanger under forced flow conditions.

During a public call held on September 26, 2019, the NRC Staff communicated the results of their acceptance review and the need for additional information to provide a clear means for demonstrating natural circulation flow (meeting minutes available under ML19270G587.) This amendment request was further discussed with the NRC Staff on October 10, 2019 [ML19302E456], October 24, 2019 [ML19339G918], November 21, 2019 [ML19329B043], and during an ongoing audit [ML19346F122]. This submittal provides additional information to enable the NRC Staff to complete their review.

Enclosures 1 through 5 were provided with the original LAR-19-017, SNC letter ND-19-0947. To provide additional information to the NRC Staff to complete their review, Enclosures 6 through 10 are provided herein which replace Enclosures 1 through 5 of ND-19-0947 in their entirety. Enclosure 6 provides the revised proprietary description, technical evaluation, regulatory evaluation (including the significant hazards consideration which remains unchanged), and environmental considerations for the proposed changes **(Withheld Information)**. The enclosure

contains information proprietary to Westinghouse Electric Company LLC ("Westinghouse"), it is supported by an Affidavit signed by Westinghouse, the owner of the information. The Affidavit sets forth the basis on which the information may be withheld from public disclosure by the Nuclear Regulatory Commission ("Commission") and addresses with specificity the considerations listed in paragraph (b)(4) of Section 2.390 of the Commission's regulations. Accordingly, it is respectfully requested that the information which is proprietary to Westinghouse be withheld from public disclosure in accordance with 10 CFR Section 2.390 of the Commission's regulations. Correspondence with respect to the copyright or proprietary aspects of the items listed above or the supporting Westinghouse Affidavit should reference CAW-20-5004 and should be addressed to Camille T. Zozula, Manager, Infrastructure & Facilities Licensing, Westinghouse Electric Company, 1000 Westinghouse Drive, Suite 165, Cranberry Township, Pennsylvania 16066.

Enclosure 7 provides the revised non-proprietary description, technical evaluation, regulatory evaluation (including the significant hazards consideration which remains unchanged), and environmental considerations for the proposed changes.

Enclosure 8 provides the revised background and supporting basis for the requested exemption.

Enclosure 9 provides the updated proposed changes to the licensing basis documents.

Enclosure 10 provides the Westinghouse Proprietary Information Notice, Copyright Notice and CAW-20-5004, supporting the proprietary nature of information provided in Enclosure 6.

Enclosure 6 contains information that is considered proprietary; therefore, Enclosure 6 is requested to be withheld from disclosure to the public under 10 CFR 2.390.

This letter contains no regulatory commitments. This letter has been reviewed and confirmed to not contain security-related information.

SNC requests NRC staff review and approval of the license amendment request (LAR) no later than March 20, 2020. Approval by this date will allow sufficient time to implement licensing basis changes necessary to support activities related to the PRHR heat exchanger preoperational test. SNC expects to implement the proposed amendment within 30 days of approval of the LAR.

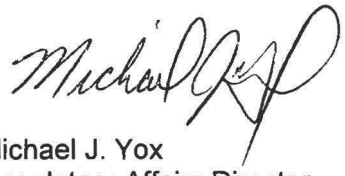
In accordance with 10 CFR 50.91, SNC is notifying the State of Georgia of this LAR by transmitting a copy of this letter and enclosures to the designated State Official.

Should you have any questions, please contact Mr. Nick Kellenberger at (706) 437-2333.

I declare under penalty of perjury that the foregoing is true and correct.
Executed on the 31st of January 2020.

Respectfully submitted,

SOUTHERN NUCLEAR OPERATING COMPANY



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Vogtle 3 & 4

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Enclosures: 6) Vogtle Electric Generating Plant (VEGP) Units 3 and 4 – Revision to Request for License Amendment: Removal of the Preoperational Passive Residual Heat Removal Heat Exchanger Natural Circulation Test (Proprietary) (LAR-19-017R1) **(Withheld Information)**

7) Vogtle Electric Generating Plant (VEGP) Units 3 and 4 – Revision to Request for License Amendment: Removal of the Preoperational Passive Residual Heat Removal Heat Exchanger Natural Circulation Test (Non-proprietary) (LAR-19-017R1)

8) Vogtle Electric Generating Plant (VEGP) Units 3 and 4 – Revision to Exemption Request: Removal of the Preoperational Passive Residual Heat Removal Heat Exchanger Natural Circulation Test (LAR-19-017R1)

9) Vogtle Electric Generating Plant (VEGP) Units 3 and 4 – Proposed Changes to the Licensing Basis Documents (LAR-19-017R1)

10) Vogtle Electric Generating Plant (VEGP) Units 3 and 4 – Westinghouse Affidavit, CAW-20-5004 (LAR-19-017R1)

cc:

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Southern Nuclear Operating Company

ND-20-0092

Enclosure 7

Vogtle Electric Generating Plant (VEGP) Units 3 and 4

Revision to Request for License Amendment:

Removal of the Preoperational Passive Residual Heat Removal Heat Exchanger Natural Circulation Test (Non-Proprietary)

(LAR-19-017R1)

(This Enclosure consists of 24 pages, including this cover page)

Table of Contents

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 8 requests the exemption necessary to implement the involved changes to the plant-specific Tier 1 information.

2. DETAILED DESCRIPTION

One of the primary functions of the passive core cooling system (PXS) is to provide emergency core cooling from the reactor coolant system (RCS) following postulated design basis events. The PXS consists of a subloop, also known as the emergency core decay heat removal subsystem, that contains a passive residual heat removal (PRHR) heat exchanger (HX) and associated valves, piping, and instrumentation. The inlet line connects the PRHR HX through the subloop piping to the hot leg of loop 1 of the RCS. The inlet line is insulated and routed continuously upward from the hot leg to a high point above the PRHR HX inlet, going through a normally open inlet valve (PXS-PL-V101) and then a cold trap prior to entering the PRHR HX (which is at least 26.3 feet above the centerline of the RCS hot leg). The outlet piping from the PRHR HX passes the flow through the two, parallel, normally closed outlet valves (PXS-PL-V108A/B) and ultimately returns the RCS flow to the steam generator channel head. The outlet piping is routed with a slight slope downward and includes a loop seal at the connection with steam generator channel head, cold trapping the return line coolant. This arrangement ensures that the water in the PRHR inlet line will remain hot and maintains a thermal driving head during normal plant standby conditions, which will provide for natural circulation of the PRHR HX water.

The subloop is shown on Updated Final Safety Analysis Report (UFSAR) Figure 6.3-1 Sheet 2, with a simplified figure shown as Figure 1.

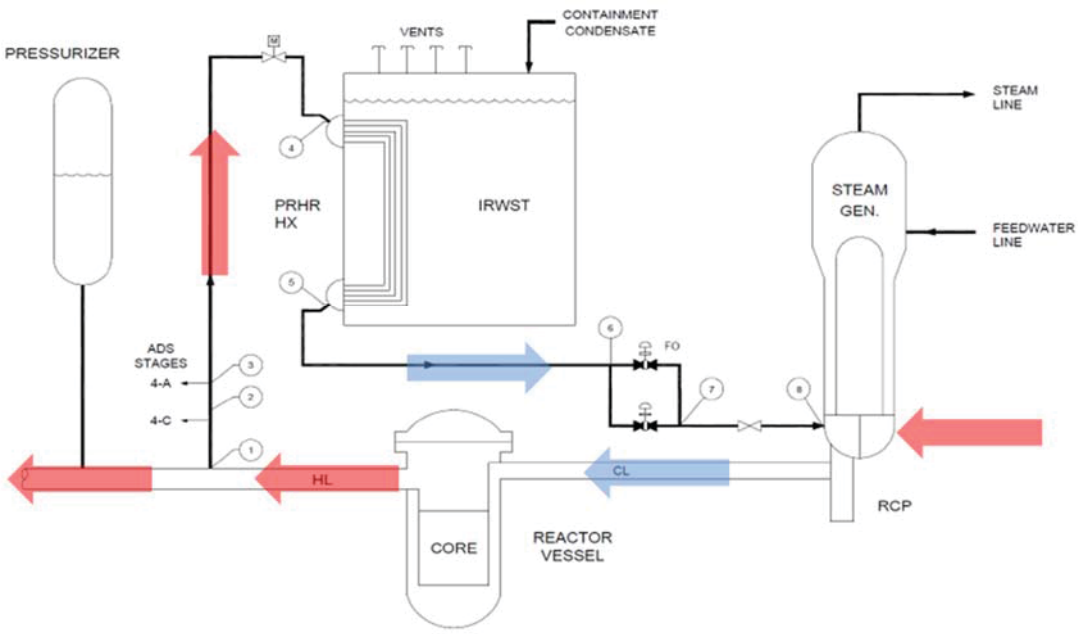

Figure 1: Simplified PRHR Flow Path Diagram

The PRHR subloop is designed to remove sufficient decay heat so that its operation, in conjunction with available inventory in the steam generators, provides RCS cooling. The PRHR HX provides emergency core decay heat removal in the event of RCS heat up transients (i.e., loss of main feedwater, main feedwater line break, or station blackout), during a steam generator tube rupture event, and during non-LOCA events. The PRHR HX also provides safe shutdown heat removal capability.

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 6.3.1.1.

UFSAR Subsection 14.2.9.1.3 item (e) validates that the cold traps prior to the PRHR HX inlet and the steam generator channel head connection are functioning as designed. The test measures the heat exchanger supply and return line piping water temperatures, which verifies the appropriate driving head (through water density due to temperature differences) exists so that natural circulation can initiate when the PRHR subloop is actuated. Natural circulation flow occurs when the PRHR outlet valves are opened. In addition to this test, as noted in UFSAR Subsection 6.3.2.2.5, the PRHR HX inlet and outlet line temperatures are monitored by indications and alarms. The operator can take action, as required, to meet the technical specification surveillance requirements or follow emergency operating procedures for control of the passive residual heat removal heat exchanger operation.

Two circulation tests are performed on the PRHR HX during preoperational testing, a natural circulation test and a forced flow circulation test. UFSAR Subsection 14.2.9.1.3 item (f) describes the natural circulation flow test, including; required test conditions, temperature measurements, acceptance criteria, and analysis conditions (e.g., number of tubes plugged). UFSAR Subsection 14.2.9.1.3 item (g) describes the forced flow test, including; required operating conditions, temperature measurements, acceptance criteria and analysis conditions. Both tests confirm the heat transfer capability of the PRHR HX. The forced flow circulation test is used as the baseline for inservice testing of the PRHR HX, described in UFSAR Table 3.9-17.

Initial verification of the reactor coolant system flow rate is made during the plant initial test program as described in UFSAR Subsection 5.4.1.4.1. Reactor coolant system flow rates are measured during the pre-core load hot functional tests, and during the startup tests. The objective of these tests is to verify that the reactor coolant system flow rate meets the flow rate range of Technical Specification (TS) 3.4.1. TS Limiting Condition for Operation (LCO) 3.4.1.c requires “RCS total flow rate ≥ 301,670 gpm and greater than or equal to the limit specified in the COLR.” (The COLR is the Core Operating Limits Report.) Tests described in UFSAR Subsection 14.2.9.1.1 items n) and r), and UFSAR Subsections 14.2.10.1.17, and UFSAR Subsection 14.2.10.4.11 implement the initial verification of the reactor coolant system.

UFSAR Subsection 3.9.1.1, Design Transients, defines the design transients, including service levels and testing conditions, for the equipment in the RCS. The passive residual heat removal test is accounted for as a Service Level A transient and described in UFSAR Subsection 3.9.1.1.1.17. Service Level A conditions are defined as normal conditions, plant condition PC-1 per ANS N51.1 and are analyzed using Level A service limits.

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. Related changes are made to UFSAR Subsections 1.9.4.2.1, 3.9.1.1.17, 6.3.6.1.2, and 14.2.9.1.3. for consistency with the requested change. The proposed change is not adverse as described in Section 3 below.

Licensing Bases Changes

COL Appendix C (and site-specific Tier 1), 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 the same forced flow test described 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 change 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, this 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 temperatures are recorded to verify natural circulation flow can initiate. 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

[

] (a,b,c) The technical evaluation for the proposed change is broken into three parts: changes to UFSAR Chapter 14 and COL Appendix C (and plant-specific Tier 1), associated changes to the UFSAR, and a summary.

Evaluation of UFSAR Chapter 14 and COL Appendix C Changes

The technical evaluation is supported by several key points, which are described in further detail in the following sections. The justification describes performance of the tests as required by UFSAR Subsection 14.2.9.1.3 items e), f), and g), a PRHR subsystem line resistance measurement test, performance of the First Plant Only PRHR natural circulation test, tests performed as required by UFSAR Subsection 5.4.1.4.1, and associated COL Appendix C ITAAC relevant to the PRHR subsystem.

PRHR Supply and Return Line Temperatures

UFSAR Subsection 14.2.9.1.3 item e) requires that the temperatures of 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, via the temperature measurements at the inlet and outlet of the PRHR HX. This test will demonstrate that the temperature measured at the inlet of the heat exchanger is higher than the temperature measured in the return line.

(a,b,c)

[ ](a,b,c)

Based on the temperature difference and the elevation difference in the supply and return lines (note that PRHR HX elevation verification is required in ITAAC 2.2.03.08b.02), it is demonstrated that natural circulation flow can be initiated. This confirms that the PRHR HX is capable of operating under natural circulation conditions, meeting its design requirement to initiate natural circulation flow, [

] (a,b,c) During normal operating conditions the RCS and thus the hot leg are at higher temperatures than the test conditions performed in UFSAR 14.2.9.1.3 item e) and therefore a higher thermal driving head would exist during normal operations. Also, as described in UFSAR Subsection 6.3.2.2.5 the PRHR HX inlet and outlet line temperatures are monitored by indicators and alarms during operation and therefore if any temperature is out of specification the operators would be alerted to take appropriate action to ensure sufficient thermal driving head is available to initiate natural circulation.

Performance of the PRHR Natural Circulation Flow Tests during Preoperational Testing

UFSAR Subsection 14.2.9.1.3 item f) requires that proper operation of the PRHR HX be demonstrated via a natural circulation test. The PRHR HX heat transfer capability 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 RCS at an initial temperature of ≥ 540°F. The acceptance criteria for the PRHR heat transfer under natural circulation conditions are that the heat transfer rate is ≥ 1.78E+08 Btu/hr based on a 520°F hot leg temperature and ≥ 1.11E+08 Btu/hr based on 420°F hot leg temperature with 80°F IRWST temperature and the design number of tubes plugged. The PRHR HX heat transfer rate has been adjusted to account for these different conditions and the heat transfer rate measured during the test should be adjusted for differences in the hot leg and IRWST temperature and number of tubes plugged. This test demonstrates that the heat transfer capability of the PRHR HX as a component meets the design requirements.

[ ](a,b,c)

[ ] (a,b,c)

Performance of the PRHR Forced Flow Tests during Preoperational Testing

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 HX be demonstrated via a forced flow circulation test. The PRHR HX heat transfer capability is verified by initiating and operating the heat exchanger with all four reactor coolant pumps running at a reduced speed during hot functional testing. The initial RCS temperature must be ≥ 350°F. The heat exchanger heat transfer is determined by measuring the PRHR heat exchanger flow rate and its inlet and outlet temperatures while the RCS is cooled to ≤ 250°F. This test demonstrates that the heat transfer capability of the PRHR HX as a component meets the design requirements.

[ ] (a,b,c)

PRHR Subsystem Flow Resistance Test

With the proposed removal of the natural circulation test (UFSAR 14.2.9.1.3 item f), a PRHR flow resistance test is added to the UFSAR Subsection 14.2.9.1.3 item g) test. This is the line resistance from the PRHR inlet line (at the RCS hot leg connection) to the SG channel head where the PRHR subloop connects back to the RCS. Confirmation that the line resistance is below the value described in the design analysis demonstrates that the as-built plant meets the design requirements and the conditions for initiation of natural circulation flow. The line resistance used in the supporting analysis is 3.085E-06 ft/gpm^2 and is dependent on the number of plugged PRHR HX tubes, thus the measured

resistance of the subloop must be less than or equal to that value. Even though the PRHR HX flow rates under natural circulation and forced flow are similar, the differences in Reynolds number may impact the line flow resistance measurement.

(a,b,c)

In conclusion, the measurement of the flow resistance during the PRHR forced flow resistance test is representative of the flow resistance under natural circulation conditions. [

] (a,b,c)

Operating Experience from Performance of PRHR Natural Circulation During Startup

UFSAR Subsection 14.2.10.4.29 is a first plant only test that requires demonstration of the heat removal capability of the PRHR HX with the reactor coolant system at prototypic temperatures and natural circulation conditions. The performance criterion is that the measured PRHR HX heat removal rate is equal to or greater than the heat removal rate predicted by the methodology used in the safety analysis at the measured RCS hot leg and IRWST water temperatures.

The test is performed at elevated RCS temperature and pressure [
] (a,c) The RCS coolant flows through the PRHR subsystem by opening one of the PRHR HX discharge isolation valves after the RCPs are tripped. The driving head for this test is the gravity head due to the PRHR supply and return line temperature difference.

[ ] (a,b,c)

(a,b,c)

[ ] (a,b,c)

Associated Preoperational and Startup Tests

In addition to the tests discussed above, a number of initial test program tests confirm the PXS and RCS operate as designed; specific tests highlighted here are relevant to PRHR operation during natural circulation mode; UFSAR Subsection 14.2.9.1.3 items a, b, c, and d, and UFSAR Subsection 5.4.1.4.1.

UFSAR Subsection 14.2.9.1.3 item a) requires that proper operation of the safety-related valves is verified by the performance of the baseline inservice tests (IST), as described in UFSAR Subsection 3.9.6. This includes the PRHR inlet and outlet valves, PXS-PL-V101 and PXS-PL-V108A/B. Implementation and performance of the IST program demonstrates that the valves operate as required.

UFSAR Subsection 14.2.9.1.3 items b), c), and d) require that calibration and operation of relevant PXS instrumentation (safety and non-safety related) be performed. This includes the PRHR HX flow rate instrumentation, the PRHR HX temperature and high point vent level instrumentation, and the PRHR HX supply line temperatures. The check confirms that the instruments required to monitor the PRHR HX for proper operation are calibrated and operate as designed. The instrument tests feed into continued testing of the PRHR HX and provide appropriate indications for the tests described in UFSAR Subsection 14.2.9.1.3 items e) and g).

UFSAR Subsection 14.2.9.1.1 item r) requires that pressure drops across major components of the RCS be measured and recorded using temporary instrumentation during flow testing. A verification is performed of the measurements to the design specifications.

[ ](a,b,c)

Initial verification of the reactor coolant system flow rate is made during the plant initial test program as described in UFSAR Subsection 5.4.1.4.1. Reactor coolant system flow rates are measured during the pre-core load hot functional tests, and during the startup tests. The objective of these tests is to verify that the reactor coolant system flow rate meets the flow rate range of Technical Specification 3.4.1. Tests described in UFSAR Subsection 14.2.9.1.1 items n) and r), and UFSAR Subsections 14.2.10.1.17, and UFSAR Subsection 14.2.10.4.11 implement the initial verification of the reactor coolant system. TS LCO 3.4.1.c states that the RCS total flow rate must be ≥ 301,670 gpm and greater than or equal to the limit set in the COLR.

[ ](a,b,c)

[

]$^{(a,b,c)}$

The design flow resistance of the RCS primary loop is approximately [ ] $^{(a,c)}$ This is significantly lower than the design flow resistance through only the PRHR

subloop of 3.085E-06 ft/gpm^2. This demonstrates that the majority of the line resistance for initiation of natural circulation through the PRHR HX is in the PRHR subloop and that the RCS loops will not restrict the natural circulation flow through the PRHR subloop during natural circulation.

In summary, PXS testing described in UFSAR Subsection 14.2.9.1.3 items a), b), c), and d) confirm that the safety-related valves and instrumentation operate as designed and meet requirements. The UFSAR Subsection 14.2.9.1.1 item r) test confirms that the pressure drops across the major RCS components meet the requirements of their design specifications. The UFSAR Subsection 5.4.1.4.1 test requires that RCS flows are measured during the initial test program, which confirms that the RCS (and plant) performs as designed. [

] (a,b,c)

Associated ITAACs

COL Appendix C ITAAC in Table 2.2.3-4 require components in the PXS, including those involved in PRHR HX testing and other related PXS SSCs be evaluated, acceptance criteria met, and ITAAC closed, prior to operation. The ITAAC include construction, design, and testing requirements. ITAAC 2.2.03.02a requires the PRHR HX (PXS-ME-01) and associated components; including the inlet isolation valve and the outlet control valves meet the associated ASME Code requirements. ITAAC 2.2.03.05a.i requires the PRHR HX 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 PRHR HX centerline of the heat exchanger's upper channel head is greater than 26.3 feet relative to the centerline of the hot leg. The elevation difference provides assurance that natural circulation flow will work as designed when initiated because the physical configuration of the PRHR HX relative to the RCS piping is correct. The completion of the ITAAC verifies that the PRHR installations at Vogtle Units 3 & 4 are within the standard plant AP1000 design as described in the Vogtle Units 3 & 4 UFSAR and will perform its safety-related design function. Proposed ITAAC 2.2.03.08b.01 will require a heat removal performance test of the PRHR HX under forced flow conditions.

Table 9 explains 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, and valve testing.

Table 9: PRHR Parameters

	Design		As-Built	
Parameter	**Value**	**Reference**	**Value**	**Reference**
PRHR inlet line design and sloping requirements	RCS-L134 PXS-L102	APP-RCS-PLW-034 APP-PXS-PLW-035/-036	ITAAC 2.2.03.02a (Index No. 159) RCS-L134 PXS-L102 ITAAC 2.2.03.08c.iii (Index No. 182)	Closure of ITAAC

Table 9: PRHR Parameters				
	Design		As-Built	
Parameter	**Value**	**Reference**	**Value**	**Reference**
PRHR outlet line design and sloping requirements	PXS-L103 PXS-L104A/B PXS-L105 RCS-L113	APP-PXS-PLW-041/-042 APP-PXS-PLW-041 APP-PXS-PLW-041 APP-RCS-PLW-04A/B	ITAAC 2.2.03.02a (Index No. 159) PXS-L103 PXS-L104A/B PXS-L105 RCS-L113	Closure of ITAAC
PRHR inlet valve Requirement (PXS-PL-V101)	Valve normally open, no actuation required for PRHR HX operation	APP-PV01-Z0D-118	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
PRHR outlet valve Requirement (PXS-PL-V108A/B)	Valve normally closed, actuation to open required for PRHR HX operation	APP-PV20-Z0D-101	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)	Closure of ITAAC and performance of associated preoperational tests

Table 9: PRHR Parameters				
	Design		As-Built	
Parameter	**Value**	**Reference**	**Value**	**Reference**
			ITAAC 2.2.03.11c.ii (index No. 213) Testing Requirements: UFSAR 14.2.9.1.3 a)	
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)	APP-PXS-M3-001	ITAAC 2.2.03.08b.02 (Index No. 176) ITAAC 2.2.03.08c.iv.04 (Index No. 186) ASME Requirements: ITAAC 2.2.03.02a (Index No. 159)	Closure of ITAAC
PRHR HX (PXS-ME-01)	ASME, Seismic	APP-ME02-Z0-001	ASME Requirements: ITAAC 2.2.03.02a (Index No. 159) Seismic Requirements: ITAAC 2.2.03.05a.i (Index No. 165) ITAAC 2.2.03.08b.01 (Index No. 175)	Closure of ITAAC

Evaluation of Associated UFSAR Changes

A change is proposed to UFSAR Subsection 1.9.4.2.1, TMI Action Plan Issues, Subsection I.G.1, Training Requirements, to align the discussion with the removal of the PRHR natural circulation test from the initial test program. UFSAR Appendix 1A discusses conformance with US NRC Regulatory Guides. Regulatory Guide (Reg. Guide) 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 Initial Test Programs; the AP1000 design has conformance statements for Revisions 2 and 3. The AP1000 design conformance statement for Appendix A.4.t of the Reg. Guide discusses how the requirements are met, including; "… provisions to perform pre-operational tests of the passive RHR heat exchanger…" The requirement and compliance statement will be met by the remaining PRHR HX tests. The physical aspects required to initiate natural circulation flow are confirmed by the preoperational test described in UFSAR Section 14.2.9.1.3 item e) and the heat transfer capability of the PRHR HX is confirmed by the preoperational test described in UFSAR Section 14.2.9.1.3 item g). Demonstrations of the layout of primary components as well as heat transfer measurements are confirmed during the ITAAC closure process and initial test program.

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.

Conclusions

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, UFSAR Subsection 14.2.9.1.3 item g)) 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 combined with the UFSAR Subsection 14.2.9.1.3 item e) test appropriately measures the temperatures and heat transfer of the as-installed PRHR heat exchanger, providing confirmation that the design and construction requirements of the PRHR heat exchanger are met. Any potential construction issues that could impact flow rates or PRHR heat exchanger performance would become apparent during performance of preoperational tests, including UFSAR Subsection 14.2.9.1.3 items e) and g). The addition of the line resistance measurement to UFSAR Subsection 14.2.9.1.3 item g) provides additional confirmation that the as-built PRHR lines and PRHR HX match the safety analysis model.

Finally, it should be noted that actuation of the PRHR HX and initiation of natural circulation flow through the AP1000 RCS requires that the PRHR HX outlet air operated valves (AOVs) (PXS-PL-V108A/B) transfer open. The AOVs are designed to fail open. No additional equipment is needed to initiate PRHR HX operation; there are no pumps involved, no diesel generators involved, no transfer from auxiliary power required, no special instrumentation and controls sequencing, or tuning required. The simplicity of the design provides reasonable assurance that natural circulation will initiate when required.

Therefore, [ ] (a,b,c) the ability of the PRHR forced flow test to provide operational confirmation of the PRHR performance, the associated ITAACs to confirm construction requirements, and additional associated initial test program tests, it can be concluded that the PRHR forced flow test is a suitable replacement for the natural circulation test for the purposes of construction verification. The future tests, and those already performed, demonstrate that the PRHR will perform as expected and meet its design requirements. [ ] (a,c) Removal of the PRHR HX natural circulation test, UFSAR Section 14.2.9.1.3 item f), is not an adverse change. The operational experience from previous tests, completion of required initial test program tests, and completion of the ITAAC, provides reasonable assurance that the PRHR HX will perform its design and license bases functions.

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 Subsections 1.9.4.2.1, 3.9.1.1.1.17, 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. Compliance with GDC 37 is described in UFSAR Subsection 3.1.4 which states “The testing capabilities of the system including in-service testing and inspection to confirm the structural and leaktight integrity of various components, technical specification operability and performance of the active system components, and additional in-service testing to confirm the overall operability of the system.” Technical Specifications Surveillance Requirement 3.5.4.9 requires PRHR HX heat transfer performance verification be performed in accordance with the system level operability testing program which is described in UFSAR Table 3.9-17. The test described in Note 4 of UFSAR Table 3.9-17 is the forced flow PRHR HX heat transfer capability test. Additionally, 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-19-0947

Enclosure 8

Vogtle Electric Generating Plant (VEGP) Units 3 and 4

Revision to Exemption Request:

Removal of the Preoperational Passive Residual Heat Removal Heat Exchanger

Natural Circulation Test (LAR-19-017R1)

(This Enclosure consists of 7 pages, including this cover page**)**

1.0 Purpose

Southern Nuclear Operating Company (SNC, the Licensee) requests a permanent exemption from the provisions of 10 CFR Part 52, Appendix D, Section III.B, *Design Certification Rule for the AP1000 Design, Scope and Contents*, to allow a departure from elements of the certification information in Tier 1 of the generic AP1000 Design Control Document (DCD). The regulation, 10 CFR Part 52, Appendix D, Section III.B, requires an applicant or licensee referencing Appendix D to 10 CFR Part 52 to incorporate by reference and comply with the requirements of Appendix D, including certified information in DCD Tier 1. The Tier 1 information for which a plant-specific departure and exemption is being requested includes an Inspections, Tests, Analysis and Acceptance Criteria (ITAAC) for the passive residual heat removal (PRHR) heat exchanger heat removal performance test.

This request for exemption provides the technical and regulatory basis to demonstrate that 10 CFR 52.63, §52.7, and §50.12 requirements are met and will apply the requirements of 10 CFR Part 52, Appendix D, Section VIII.A.4 to allow a departure from generic Tier 1 information due to a proposed change which would revise ITAAC 2.2.03.08b.01 to require the heat removal performance test of the PRHR heat exchanger under forced flow conditions.

2.0 Background

As described in UFSAR Section 14.2, the objectives of the preoperational testing program include demonstrating that the plant has been constructed as designed and that the systems will perform consistent with the 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 and their associated piping and valves perform the safety functions described in UFSAR Section 6.3. One of these safety functions is emergency core decay heat removal.

The UFSAR currently requires three preoperational tests to verify the PXS emergency core decay heat removal function; the 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 will be recorded to verify that natural circulation flow will initiate. 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. 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 heat exchanger with all four reactor coolant pumps running. This testing will be performed during hot functional testing with the RCS at an elevated initial temperature ≥ 350°F. The heat exchanger heat transfer rate will then be determined by measuring the heat exchanger flow rate and its inlet and outlet temperatures while the RCS is cooled to ≤ 250°F.

The second test described above, the PRHR heat exchanger heat removal performance testing, is also required by ITAAC 2.2.03.08b.01. This exemption request proposes to

replace the PRHR heat exchanger natural circulation test described in ITAAC 2.2.03.08b.01 with the PRHR heat exchanger forced flow test.

3.0 Technical Justification of Acceptability

The proposed change to remove the preoperational PRHR heat exchanger natural circulation test from the ITP is not adverse as additional methods are available to demonstrate that the PRHR heat exchanger will perform its design and license bases functions. 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 (e) and (g) as updated by this revised License Amendment Request. 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. 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.

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. Completion of the ITAAC 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 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) requires that proper operation of the PRHR heat exchanger and its heat transfer capability be demonstrated by conducting a forced flow test. 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. Additionally, Item (g) is revised to include the measurement of line resistance of the PRHR subsystem.

UFSAR Appendix 1A discusses conformance with US NRC Regulatory Guides. Regulatory Guide (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 will be confirmed by the preoperational test described in UFSAR Subsection 14.2.9.1.3 Item (e) and the heat transfer capability of the PRHR heat exchanger will be confirmed by the preoperational test described in UFSAR Section 14.2.9.1.3 Item (g).

Detailed technical justification supporting this request for exemption is provided in Section 3 of the associated License Amendment Request in Enclosure 6 of this letter.

4.0 Justification of Exemption

10 CFR Part 52, Appendix D, Section VIII.A.4 and 10 CFR 52.63(b)(1) govern the issuance of exemptions from elements of the certified design information for AP1000 nuclear power plants. Since SNC has identified changes to the Tier 1 information as discussed in Enclosure 6 of the accompanying revised License Amendment Request, an exemption from the certified design information in Tier 1 is needed.

10 CFR Part 52, Appendix D, and 10 CFR 50.12, §52.7, and §52.63 state that the NRC may grant exemptions from the requirements of the regulations provided six conditions are met: 1) the exemption is authorized by law [§50.12(a)(1)]; 2) the exemption will not present an undue risk to the health and safety of the public [§50.12(a)(1)]; 3) the exemption is consistent with the common defense and security [§50.12(a)(1)]; 4) special circumstances are present [§50.12(a)(2)]; 5) the special circumstances outweigh any decrease in safety that may result from the reduction in standardization caused by the exemption [§52.63(b)(1)]; and 6) the design change will not result in a significant decrease in the level of safety [Part 52, App. D, VIII.A.4].

The requested exemption satisfies the criteria for granting specific exemptions, as described below.

1) This exemption is authorized by law

The NRC has authority under 10 CFR 52.63, §52.7, and §50.12 to grant exemptions from the requirements of NRC regulations. Specifically, 10 CFR 50.12 and §52.7 state that the NRC may grant exemptions from the requirements of 10 CFR Part 52 upon a proper showing. No law exists that would preclude the changes covered by this exemption request. Additionally, granting of the proposed exemption does not result in a violation of the Atomic Energy Act of 1954, as amended, or the Commission's regulations.

Accordingly, this requested exemption is "authorized by law," as required by 10 CFR 50.12(a)(1).

2) This exemption will not present an undue risk to the health and safety of the public

The proposed exemption from the requirements of 10 CFR Part 52, Appendix D, Section III.B would allow a change to elements of the plant-specific Tier 1 DCD to depart from the AP1000 certified (Tier 1) design information. The plant-specific DCD Tier 1 will continue to reflect the approved licensing basis, and will maintain a consistent level of detail with that which is currently provided elsewhere in Tier 1 of the DCD. Therefore, the affected plant-specific DCD Tier 1 ITAAC will continue to serve its intended purpose.

The revision to the ITAAC on PRHR heat exchanger heat removal performance testing does not represent an adverse impact to the design functions supported by the equipment, or the associated systems, structures and components, and will continue to protect the health and safety of the public in the same manner. The revision of the ITAAC does not introduce any new industrial, chemical, or radiological hazards that would represent a public health or safety risk, nor does it modify or remove any design or operational controls or safeguards intended to mitigate any existing on-site hazards. Furthermore, the proposed change would 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 would result in fuel cladding failures. Accordingly, this change does not present an undue risk from any existing or proposed equipment or systems.

Therefore, the requested exemption from 10 CFR Part 52, Appendix D, Section III.B would not present an undue risk to the health and safety of the public.

3) The exemption is consistent with the common defense and security

The requested exemption from the requirements of 10 CFR Part 52, Appendix D, Section III.B would allow the licensee to depart from elements of the plant-specific Tier 1 design information. The proposed exemption does not alter the design, function, or operation of any structures or plant equipment that is necessary to maintain a safe and secure status of the plant. The proposed exemption has no impact on plant security or safeguards procedures.

Therefore, the requested exemption is consistent with the common defense and security.

4) Special circumstances are present

10 CFR 50.12(a)(2) lists six “special circumstances” for which an exemption may be granted. Pursuant to the regulation, it is necessary for one of these special circumstances to be present in order for the NRC to consider granting an exemption request. The requested exemption meets the special circumstances of 10 CFR 50.12(a)(2)(ii). That subsection defines special circumstances as when “Application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule.”

The rule under consideration in this request for exemption is 10 CFR Part 52, Appendix D, Section III.B, which requires that a licensee referencing the AP1000 Design Certification Rule (10 CFR Part 52, Appendix D) shall incorporate by reference and comply with the requirements of Appendix D, including Tier 1 information. The VEGP Units 3 and 4 COLs reference the AP1000 Design Certification Rule and incorporate by reference the requirements of 10 CFR Part 52, Appendix D, including Tier 1 information. The underlying purpose of Appendix D, Section III.B is to describe and define the scope and contents of the AP1000 design certification, and to require compliance with the design certification information in Appendix D.

The purpose of ITAAC is to provide reasonable assurance that the facility has been constructed and will be operated in conformity with the license, the provision of the Act, and the Commission’s rules and regulations. The proposed exemption would revise the ITAAC on PRHR heat exchanger heat removal performance testing. The proposed revision does not change the design functions of the associated systems and components as described in the licensing basis documents. Accordingly, this exemption from the certification information enables the Licensee to safely construct and operate the facility

consistent with the design certified by the NRC in 10 CFR Part 52, Appendix D. Moreover, other ITAAC and the proposed ITAAC will provide reasonable assurance that the facility has been constructed and will be operated in conformity with the license, the provisions of the Act, and the Commission's rules and regulations.

Therefore, special circumstances are present, because application of the current generic certified design information in Tier 1 as required by 10 CFR Part 52, Appendix D, Section III.B, in the particular circumstances discussed in this request is not necessary to achieve the underlying purpose of the rule.

5) The special circumstances outweigh any decrease in safety that may result from the reduction in standardization caused by the exemption.

Based on the nature of the change to the plant-specific Tier 1 information and the understanding that the change supports the design function of the supported equipment, it is expected that this exemption may be requested by other AP1000 licensees and applicants. However, a review of the reduction in standardization resulting from the departure from the standard DCD determined that even if other AP1000 licensees and applicants do not request this same departure, the special circumstances will continue to outweigh any decrease in safety from the reduction in standardization because the key design functions of the equipment associated with this request will continue to be maintained. Furthermore, the justification provided in the license amendment request and this exemption request and the associated mark-ups demonstrate that there is a limited change from the standard information provided in the generic AP1000 DCD, which is offset by the special circumstances identified above.

Therefore, the special circumstances associated with the requested exemption outweigh any decrease in safety that may result from the reduction in standardization caused by the exemption.

6) The design change will not result in a significant decrease in the level of safety.

The exemption revises the plant-specific DCD Tier 1 information by revising ITAAC on PRHR heat exchanger heat removal performance testing. The revision does not change the design requirements of the associated equipment and the other ITAAC and proposed ITAAC will provide reasonable assurance that the facility has been constructed and will be operated in conformity with the license, the provisions of the Act, and the Commission's rules and regulations. Because these functions continue to be met and verified, there is no reduction in the level of safety.

5.0 Risk Assessment

A risk assessment was not determined to be applicable to address the acceptability of this proposal.

6.0 Precedent Exemptions

None

7.0 Environmental Consideration

The Licensee requests a departure from elements of the certified information in Tier 1 of the generic AP1000 DCD. The Licensee has determined that the proposed departure would require a permanent exemption from the requirements of 10 CFR Part 52, Appendix D, Section III.B, *Design Certification Rule for the AP1000 Design, Scope and Contents,* with respect to installation or use of facility components located within the restricted area, as defined in 10 CFR Part 20, or which changes an inspection or a surveillance requirement; however, the Licensee evaluation of the proposed exemption has determined that the proposed exemption meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9).

Based on the above review of the proposed exemption, the Licensee has determined that the proposed activity does 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, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed exemption meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), an environmental impact statement or environmental assessment of the proposed exemption is not required.

Specific details of the environmental considerations supporting this request for exemption are provided in Section 5 of the associated License Amendment Request provided in Enclosure 6 of this letter.

8.0 Conclusion

The proposed change to Tier 1 is necessary to revise ITAAC on PRHR heat exchanger heat removal performance testing. The exemption request meets the requirements of 10 CFR 52.63, *Finality of design certifications*, 10 CFR 52.7, *Specific exemptions*, 10 CFR 50.12, *Specific exemptions*, and 10 CFR Part 52 Appendix D, *Design Certification Rule for the AP1000*. Specifically, the exemption request meets the criteria of 10 CFR 50.12(a)(1) in that the request is authorized by law, presents no undue risk to public health and safety, and is consistent with the common defense and security. Furthermore, approval of this request does not result in a decrease in the level of safety, satisfies the underlying purpose of the AP1000 Design Certification Rule, and does not present a decrease in safety as a result of a reduction in standardization.

9.0 References

None

Southern Nuclear Operating Company

ND-20-0092

Enclosure 9

Vogtle Electric Generating Plant (VEGP) Units 3 and 4

Proposed Changes to the Licensing Basis Documents

(LAR-19-017R1)

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 x 10^8~~ 8.46 x 10^7 Btu/hr with ~~520~~ 250°F HL Temp and ~~80°F~~ an initial IRWST temperature~~s~~ of 80°F. ~~1.11 x 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 >400°F and the measured return line temperature is <220°F.

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 and flow resistance 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.

* * *

Southern Nuclear Operating Company

ND-20-0092

Enclosure 10

Vogtle Electric Generating Plant (VEGP) Units 3 and 4

Westinghouse Affidavit, CAW-20-5004

(LAR-19-017R1)

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

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:
COUNTY OF BUTLER:

(1) I, Zachary S. Harper, have been specifically delegated and authorized to apply for withholding and execute this Affidavit on behalf of Westinghouse Electric Company LLC (Westinghouse).

(2) I am requesting the proprietary portions of APP-FSAR-GLN-1118 Revision 1 and APP-GW-GLY-181 Revision 0 be withheld from public disclosure under 10 CFR 2.390.

(3) I have personal knowledge of the criteria and procedures utilized by Westinghouse in designating information as a trade secret, privileged, or as confidential commercial or financial information.

(4) Pursuant to 10 CFR 2.390, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse and is not customarily disclosed to the public.

(ii) Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar technical evaluation justifications and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

AFFIDAVIT

(5) Westinghouse has policies in place to identify proprietary information. Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage (e.g., by optimization or improved marketability).

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.

(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

(f) It contains patentable ideas, for which patent protection may be desirable.

(6) The attached documents are bracketed and marked to indicate the bases for withholding. The justification for withholding is indicated in both versions by means of lower case letters (a) through (f) located as a superscript immediately following the brackets enclosing each item of information being identified as proprietary or in the margin opposite such information. These lower case letters

AFFIDAVIT

refer to the types of information Westinghouse customarily holds in confidence identified in Sections (5)(a) through (f) of this Affidavit.

I declare that the averments of fact set forth in this Affidavit are true and correct to the best of my knowledge, information, and belief.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on: 1/30/2020

Zachary S. Harper, Manager
Licensing Engineering