SAFETY EVALUATION BY THE OFFICE OF NEW REACTORS

RELATED TO AMENDMENT NOS. 91 AND 90

TO THE COMBINED LICENSE NOS. NPF-91 AND NPF-92, RESPECTIVELY

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VOGTLE ELECTRIC GENERATING PLANT UNITS 3 AND 4

DOCKET NOS. 52-025 AND 52-026

1.0 INTRODUCTION

By letter dated October 14, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16288A810), and supplemented by letters dated February 23, 2017 (ADAMS Accession No. ML17054D204), and May 9, 2017 (ADAMS Accession No. ML17129A589), Southern Nuclear Operating Company (SNC) submitted License Amendment Request (LAR) 16-018 requesting that the U.S. Nuclear Regulatory Commission (NRC or Commission) amend the combined licenses (COL) for Vogtle Electric Generating Plant (VEGP) Units 3 and 4, COL Nos. NPF-91 and NPF-92, respectively.

The specific changes proposed in the LAR would revise the licensing basis documents to add additional design details to the automatic depressurization system (ADS) injection blocking devices and to add new blocking devices to the design of the in-containment refueling water storage tank (IRWST) injection squib valves actuation logic in the safety-related protection and safety monitoring system (PMS). The ADS injection blocking device is currently already described in Updated Safety Analysis Report (UFSAR) Subsection 7.3.1.2.4.1, “Block to Prevent ADS Spurious Actuation,” and additional design details are proposed in this LAR to describe how and where it interfaces with the PMS for the blocking devices. The purpose of the ADS and IRWST injection blocking devices is to prevent spurious actuations of ADS and IRWST injection valves primarily due to a potential software common cause failure (CCF) in the digital PMS.

Therefore, the licensee proposes to depart from Tier 2* and associated Tier 2 information in the UFSAR, requests related changes to plant-specific Design Control Document (DCD) Tier 1

information with corresponding changes to the associated COL Appendix C information, and proposes additional changes to technical specifications in COL Appendix A.

In accordance with the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR) 52.63(b)(1), the licensee also requests an exemption from elements of the design as certified in 10 CFR Part 52, Appendix D, "Design Certification Rule for the AP1000 Design," for plant-specific Tier 1 information. The requested exemption would allow a departure from the corresponding portions of the certified information in Tier 1 of the generic DCD.[1] In order to modify the UFSAR (the plant-specific DCD) Tier 1 information, the NRC must find the licensee's exemption request included in this LAR to be acceptable.

In the letters dated February 23, 2017 and May 9, 2017, the licensee provided responses to the NRC staff's requests for additional information (RAIs). The RAI responses did not expand the scope of the original LAR, and did not change the NRC staff's originally proposed no significant hazards consideration as published in the *Federal Register* on December 20, 2016 (81 FR 92873).

2.0 REGULATORY BASIS

The NRC staff considered the following regulatory requirements in reviewing the proposed changes.

10 CFR, Section 50.55a(h)(3), "Protection and Safety Systems," requires nuclear power plants with combined licenses under Part 52 to comply with Institute of Electrical and Electronics Engineers (IEEE) Standard (Std.) 603-1991, "IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations," and the correction sheet dated January 30, 1995. Specifically, Clause 5.1 of IEEE Std. 603-1991 on single failure criterion requires, in part, that safety systems shall perform all safety functions required for a design basis event in the presence of any single detectable failure within the safety systems concurrent with all identifiable but non-detectable failures. Clause 5.6 of IEEE Std. 603-1991 on independence criterion requires, in part, that redundant portions of a safety system provided for a safety function shall be independent of and physically separated from each other to the degree necessary to retain the capability to accomplish the safety function during and following any design basis event requiring that safety function. Clause 7.3 of IEEE Std. 603-1991 on completion of protective action requires, in part, that the design of the execute features shall be such that once initiated, the protective actions of the execute features shall go to completion. The added design details and changes proposed for the blocking devices in this LAR involve the safety-related PMS. Therefore, the proposed design details and changes are required to comply with the requirements in IEEE Std. 603-1991.

10 CFR Part 50, Appendix A, General Design Criterion (GDC) 22 on protection system independence requires that the protection system be designed to assure that the effects of natural phenomena, and of normal operating, maintenance, testing, and postulated accident conditions on redundant channels do not result in loss of the protection function, or shall be demonstrated to be acceptable on some other defined basis. Design techniques, such as

[1] While the licensee describes the requested exemption as being from Section III.B of 10 CFR Part 52, Appendix D, the entirety of the exemption pertains to proposed departures from Tier 1 information in the generic DCD. In the remainder of this evaluation, the NRC will refer to the exemption as an exemption from Tier 1 information to match the language of Section VIII.A.4 of 10 CFR Part 52, Appendix D, which specifically governs the granting of exemptions from Tier 1 information.

functional diversity or diversity in component design and principles of operation, shall be used to the extent practical to prevent loss of the protection function. The licensee proposed changes and design details in this LAR which are related to the protection system. Therefore, the changes proposed are required to meet the regulatory requirements 10 CFR Part 50, Appendix A, GDC 22.

10 CFR 52.98(f) states that any modification to, addition to, or deletion from the terms and conditions of a COL, including any modification to, addition to, or deletion from the inspections, tests, analyses, and acceptance criteria (ITAAC) contained in the license, is a proposed amendment to the license.

10 CFR Part 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, or the Technical Specifications (TS), or requires a license amendment under paragraphs B.5.b or B.5.c of the section.

10 CFR Part 52, Appendix D, Section VIII.A.4, states that exemptions from Tier 1 information are governed by the requirements in 10 CFR 52.63(b)(1) and 10 CFR 52.98(f). It also states that the Commission will deny such a request if it finds that the design change will result in a significant decrease in the level of safety otherwise provided by the design.

10 CFR Part 52, Appendix D, Section VIII.C.6 states that after issuance of a license, "[c]hanges to the plant-specific TS will be treated as license amendments under 10 CFR 50.90." 10 CFR 50.90 addresses the applications for amendments of licenses, construction permits, and early site permits.

10 CFR 52.63(b)(1) allows licensees who reference a design certification rule to request an exemption from one or more elements of the certified information. The Commission may grant such a request only if it complies with the requirements of 10 CFR 52.7, which, in turn, points to the requirements listed in 10 CFR 50.12 for specific exemptions. In addition, 10 CFR 52.63(b)(1) states that, when considering the granting of an exemption, the Commission considers whether the special circumstances present outweigh any decrease in safety that may result from the reduction in standardization caused by the exemption. Therefore, any exemption from the Tier 1 information certified by Appendix D to 10 CFR Part 52 must comply with the requirements of 10 CFR 50.12, 52.7, and 52.63(b)(1).

3.0 TECHNICAL EVALUATION

3.1 EVALUATION OF EXEMPTION REQUEST

Section III.B of Appendix D to 10 CFR Part 52 requires a holder of a COL referencing Appendix D to 10 CFR Part 52 to incorporate by reference and comply with the requirements of Appendix D, including the certified information in Tier 1 of the generic AP1000 DCD. Exemptions from Tier 1 information are governed by the change process in Section VIII.A.4 of Appendix D of 10 CFR Part 52.

The Tier 1 information in the plant-specific DCD for which a plant-specific departure and exemption was requested, includes revisions to plant-specific DCD Tier 1 information by adding the manual ADS and IRWST injection unblocking control switch to Tier 1 Table 2.5.2-5 and adding the ADS and IRWST injection actuation PMS Blocking to Tier 1 Table 2.5.2-6. The

result of this exemption would be that the licensee could implement modifications to Tier 1 information in the LAR if, and only if, the NRC approves the LAR. This is a permanent exemption limited in scope to the particular Tier 1 information specified.

As stated in Section VIII.A.4 of Appendix D to 10 CFR Part 52, an exemption from Tier 1 information is governed by the requirements of 10 CFR 52.63(b)(1) and 52.98(f). Additionally, Section VIII.A.4 of Appendix D to 10 CFR Part 52 provides that the Commission will deny a request for an exemption from Tier 1 if it finds that the requested change will result in a significant decrease in the level of safety otherwise provided by the design. Pursuant to 10 CFR 52.63(b)(1), the Commission may grant exemptions from one or more elements of the certified information, so long as the criteria given in 10 CFR 52.7, which, in turn, references 10 CFR 50.12, is met and that the special circumstances, as defined by 10 CFR 50.12(a)(2), outweigh any potential decrease in safety due to reduced standardization.

Pursuant to 10 CFR 52.7, the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of 10 CFR Part 52. As 10 CFR 52.7 states, the Commission's consideration will be governed by 10 CFR 50.12, "Specific exemptions." 10 CFR 50.12 states that an exemption may be granted when: (1) the exemptions are authorized by law, will not present an undue risk to the public health and safety, and are consistent with the common defense and security; and (2) special circumstances are present. Specifically, 10 CFR 50.12(a)(2) lists six circumstances for which an exemption may be granted. It is necessary for one of these bases to be present in order for the NRC to consider granting an exemption request. The licensee stated that the requested exemption meets the special circumstances of 10 CFR 50.12(a)(2)(ii). That subparagraph 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 staff's evaluation of the exemption request is presented below.

3.1.1 AUTHORIZED BY LAW

This exemption would allow the licensee to implement changes to elements of the plant-specific Tier 1 DCD to depart from the AP1000 certified (Tier 1) design information. This exemption is a permanent exemption limited in scope to particular Tier 1 information. Subsequent changes to the plant-specific Tier 1 DCD would be subject to the exemption process specified in Section VIII.A.4 of Appendix D to 10 CFR Part 52 and the requirements of 10 CFR 52.63(b)(1). As stated above, 10 CFR Part 52, Appendix D, Section VIII.A.4 allows the NRC to grant exemptions from one or more elements of the Tier 1 information. Based on 10 CFR Part 52, Appendix D, Section VIII.A.4, the NRC staff has determined that granting of the licensee's proposed exemption will not result in a violation of the Atomic Energy Act of 1954, as amended, or the Commission's regulations. Therefore, as required by 10 CFR 52.7 and 10 CFR 50.12(a)(1), the exemption is authorized by law.

3.1.2 NO UNDUE RISK TO PUBLIC HEALTH AND SAFETY

The underlying purpose of Appendix D to 10 CFR Part 52 is to ensure that a licensee will construct and operate the plant based on the approved information found in the DCD incorporated by reference into Vogtle Units 3 and 4 licensing basis. The exemption proposed by the licensee from the requirements of 10 CFR Part 52, Appendix D, Section III.B would allow changes to elements of the plant-specific Tier 1 DCD, resulting in a departure from the AP1000 certified (Tier 1) design information. The specific changes proposed by the licensee include revision of the plant-specific DCD Tier 1 information by adding the manual ADS and IRWST

injection unblocking control switch to Tier 1 Table 2.5.2-5 and also adding the ADS and IRWST injection actuation PMS Block to Tier 1 Table 2.5.2-6. The plant-specific DCD Tier 1 information would continue to reflect the approved licensing basis for VEGP Units 3 and 4, and would maintain a level of detail consistent with that which is currently provided elsewhere in Tier 1 of the DCD. Specifically, the affected design description in the plant-specific Tier 1 information will continue to provide the detail necessary to support the performance of the associated ITAAC. Therefore, the affected plant-specific DCD Tier 1 information would continue to serve its required purpose.

The changes proposed in this LAR will not impact the ability of the PMS to perform its design functions. Because the changes will not alter the intended operation of any plant equipment or systems, they do not present any undue risk for existing equipment or systems. The proposed changes do not introduce any new industrial, chemical, or radiological hazards that would represent a public health or safety risk, nor do they remove any design or operational controls or safeguards that are intended to mitigate any existing on-site hazards. Furthermore, the proposed changes 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. The staff finds that the requested exemption from 10 CFR Part 52, Appendix D, Section III.B would not pose any adverse impact to the design function and would continue to protect the health and safety of the public in the same manner as required by 50.12(a)(1).

3.1.3 CONSISTENT WITH COMMON DEFENSE AND SECURITY

The proposed exemption would allow the licensee to depart from elements of the plant-specific DCD Tier 1 information. This proposed exemption would be a permanent exemption limited in scope to particular information specified. Any changes to other Tier 1 information would be subject to the exemption process in Section VIII.A.4 of Appendix D to 10 CFR Part 52. The proposed changes do not alter or impede the design, function, or operation of any plant structures, systems, or components (SSCs) associated with the facility's physical or cyber security and, therefore, does not affect any plant equipment that is necessary to maintain a safe and secure plant status. In addition, the proposed changes have no impact on plant security or safeguards. Therefore, as required by 10 CFR 50.12(a)(1), the staff finds that the common defense and security is not impacted by this exemption.

3.1.4 SPECIAL CIRCUMSTANCES

Special circumstances, in accordance with 10 CFR 50.12(a)(2)(ii), are present whenever 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. Special circumstances are present here because the application of the specified Tier 1 information is not required to serve the underlying purpose of the rule. The underlying purpose of the Tier 1 information is to ensure that a licensee will safely construct and operate a plant based on the certified information found in the AP1000 DCD, which was incorporated by reference into the VEGP's licensing basis.

The exemption proposed in this LAR would revise the plant-specific DCD Tier 1 information by adding the manual ADS and IRWST injection unblocking control switch to Tier 1, Table 2.5.2-5 and adding the ADS and IRWST injection actuation Block to Tier 1, Table 2.5.2-6 for the PMS. The underlying purpose of the rule is to provide system configurations that are acceptable to safely construct and operate the plant. The proposed change to include design details for the existing ADS injection blocking devices provides additional clarity and supports actual system

functions. Further, the proposed addition of new blocking devices to the design of the IRWST injection squib valves actuation logic in the safety-related PMS also supports actual system functions. These proposed changes, assessed in detail in Section 3.2 of this safety evaluation (SE), maintain the required design functions. The changes proposed do not adversely affect any function or feature used for the prevention and mitigation of accidents or their safety analyses. The proposed changes do not involve nor interface with any SSC accident initiator or initiating sequence of events related to the accidents evaluated and therefore do not have an adverse effect on any SSC's design function. Accordingly, this exemption from the certified information will enable the licensee to safely construct and operate the AP1000 facility consistent with the design certified by the NRC in 10 CFR 52, Appendix D.

Because application of the specified generic certified information in Tier 1 is not necessary to achieve the underlying purpose of the rule, the staff finds that the special circumstances required by 10 CFR 50.12(a)(2)(ii) for the granting of an exemption from the Tier 1 information exist.

3.1.5 SPECIAL CIRCUMSTANCES OUTWEIGH REDUCED STANDARDIZATION

Under 52.63(b)(1) "[i]n addition to the factors listed in § 52.7, the Commission shall consider whether the special circumstances that § 52.7 requires to be present outweigh any decrease in safety that may result from the reduction in standardization caused by the exemption." Based on the nature of the departure proposed in this LAR from the plant-specific DCD Tier 1 information and the understanding that these changes support the actual system functions, it is likely that other AP1000 licensees will request this exemption. However, even if this is not the case, the special circumstances present continue to outweigh any decrease in safety from the reduction in standardization because the design functions of the systems associated with this LAR will continue to be maintained. This exemption request and the associated changes to Tier 1 Table 2.5.2-5 and Table 2.5.2-6 demonstrate that there is a minimal change from the generic AP1000 DCD, minimizing the reduction in standardization and consequently the safety impact from the reduction. The design details are provided for the blocking devices of the ADS injection valves included in the AP1000 design certification, and new blocking devices and their design details are proposed for the IRWST injection valves in this LAR. The proposed information in this LAR provides the latest design details about the plant as designed and constructed. The benefit of increased detail and accuracy about actual system functions outweigh any decrease in safety that may result from the reduction in standardization caused by the exemption.

Therefore, as required by 10 CFR Part 52.63(b)(1), the staff finds that the special circumstances associated with this requested exemption outweigh any decrease in safety that may result from the reduction in standardization caused by the exemption.

3.1.6 NO SIGNIFICANT REDUCTION IN SAFETY

This exemption request would allow the licensee to revise the plant-specific DCD Tier 1 information by adding the manual unblocking control switch for each ADS and IRWST injection valve to Table 2.5.2-5 and by adding the actuation PMS Block to Table 2.5.2-6 for each ADS and IRWST injection valve. The staff finds that these proposed changes do not adversely interface with or adversely affect safety related equipment or a fission product barrier, and do not impact the functional capabilities of the PMS. No system or design function or equipment qualification (EQ) is adversely affected by the proposed changes. Because the changes associated with this exemption request will continue to meet existing Codes and Standards and

methodologies described in the UFSAR, the level of safety provided by the current SSCs remains unchanged.

Because the proposed changes to the SSCs will not affect the ability of the SSCs to perform their design functions and the level of safety provided is unchanged, the staff concludes, as required by 10 CFR Part 52, Appendix D, Section VIII.A.4, that the changes associated with the proposed exemption will not result in a significant decrease in the level of safety.

3.2 EVALUATION OF PROPOSED CHANGES

The PMS is a safety-related digital Instrumentation and Control (I&C) protection safety system, which detects off-normal conditions and actuates the appropriate safety-related functions necessary to achieve and maintain the plant in a safe shutdown condition. The PMS controls safety-related components in the plant that are operated from the main control room (MCR) or remote shutdown workstation (RSW). In addition, the PMS provides the equipment in the MCR necessary to monitor the plant safety-related functions during and following an accident.

The ADS consists of four different stages of valves. The first three stages each have two lines and each line has two normally closed valves in series. The fourth stage has four lines with each line having two valves, one normally open and one normally closed, in series. The first, second, and third stage valves have direct current motor operators. The normally closed fourth stage valves are squib valves. The ADS valves are designed to automatically open when actuated and to remain open for the duration of an automatic depressurization event. ADS Stages 1 and 4 valves actuate at discrete core makeup tank (CMT) levels, as either tank's level decreases during injection. ADS Stages 2 and 3 valves actuate based upon a time delay after the preceding stage is sent a signal to open. This opening sequence provides a controlled depressurization of the reactor coolant system. By depressurizing the reactor coolant system (RCS), the ADS allows lower pressure injection sources, such as the IRWST, to perform their safety injection function.

The IRWST contains cold borated water. The bottom of the IRWST is above the RCS loop elevation so that the borated water can drain by gravity into the RCS after it is sufficiently depressurized. The IRWST is connected to the RCS through two direct vessel injection lines. The isolation valves for each gravity injection line are arranged in two parallel paths, each path having one squib valve backed up by one check valve.

There are two major changes proposed in this LAR: (1) revise the licensing basis documents to add design details for the ADS injection blocking device; and (2) add new blocking devices to the design of the IRWST injection squib valves actuation logic in the PMS. The purpose of both the ADS and IRWST injection blocking devices are to prevent spurious actuation of ADS and IRWST injection valves primarily due to a potential software CCF in the PMS. The evaluation of these two changes from various technical perspectives is presented below.

3.2.1 Evaluation of I&C Changes

The LAR proposes additional design details to be added to the licensing basis for the ADS injection blocking device. The ADS injection blocking device is already included in Subsection 7.3.1.2.4.1 of the certified AP1000 DCD, "Block to Prevent ADS Spurious Actuation." However, specific design details of the ADS blocking device were not available at the time the AP1000 design certification was issued. The licensee proposes design details in this LAR for the ADS injection blocking devices.

The licensee also proposes to add new blocking devices in this LAR to the IRWST injection valve actuation logic in the PMS. Similar to the purpose of the blocking devices for ADS injection, the blocking devices for IRWST injection valves are included to prevent spurious actuations of IRWST injection valves because of the potential software CCF in the PMS. The licensee states in the LAR that the purpose of adding a new blocking device for the IRWST injection squib valves is to prevent spurious IRWST injection valve opening, which could result in a loss of coolant accident (LOCA).

However, after initial review of the LAR, the staff determined that in each injection line of the IRWST, there is a check valve to prevent the reactor coolant from flowing back to the IRWST. Because of this design feature, the staff concluded that that there is a lack of design information in the LAR on how the LOCA could happen even if there is a CCF in the PMS to cause spurious actuation of the IRWST injection valves. Also, the staff concluded that there is a lack of information in the LAR to justify the changes to add new blocking devices for the IRWST injection valve actuation logic in the PMS. The staff found that, due to the additional complexity being added to the IRWST squib valve actuation circuit as a result of the proposed blocking devices, there could be an increase in risk associated with the probability that the IRWST injection squib valves would not open when required. Therefore, the staff issued an RAI requesting the licensee to provide clarification and additional justification for the proposed change.

In its February 23, 2017 RAI response, the licensee stated that the structural integrity of the IRWST check valves and piping were assessed for a spurious IRWST injection squib valve opening at full RCS pressure. The maximum differential pressure was evaluated for either one squib valve opening or both squib valves (in the same train) opening at full RCS pressure. SNC stated that the pressures experienced on the check valves would be enough to expect a small amount of plastic deformation, but the functionality of the check valve to prevent backflow through the check valve would still be maintained. However, because there is a 1/8" diameter hole in the design of each check valve for pressure balancing, the licensee stated in the LAR that loss of reactor coolant into the IRWST would be expected. The staff evaluated the above additional information and concludes that it is adequate to support the purpose of adding the new blocking devices for the IRWST injection squib valves to prevent a LOCA if the injection squib valves are actuated spuriously. The staff also evaluated this proposed change from a risk perspective in Section 3.2.6 of this SE.

In its evaluation, the staff also determined that there is a lack of information in the LAR on the commercial dedication for the blocking devices. The staff issued a second RAI on April 13, 2017 (ML17103A342) requesting the licensee to provide adequate information accordingly. The licensee states in the LAR that the blocking device is composed of commercial-off-the-shelf components, which have been commercially dedicated. The ADS and IRWST injection blocking devices, located within four PMS bi-stable and coincident logic cabinets (BCCs), are included in the PMS EQ program. These standard components include a current converter, alarm modules, and relays. In the RAI response, the licensee clarified that the ADS and IRWST injection blocking devices are dedicated in accordance with the Westinghouse Electric Company (Westinghouse) Quality Management System (QMS), which was previously approved by the NRC staff on December 29, 2014 (ML14336A487). The Westinghouse QMS complies with statutory, regulatory, industry, and customer quality requirements that are applicable to items (i.e., structure, system, or components, or part thereof) and services provided by Westinghouse's world-wide operations. Section 4.3.9 of the QMS describes the Westinghouse process for the dedication of commercial-grade items. The dedication information within the QMS informs lower level quality procedures which provide more specific guidance for dedicating

components, such as the ADS and IRWST injection blocking devices. The licensee stated in the RAI response that these processes were followed in the dedication of the ADS and IRWST injection blocking device. The staff finds that the above additional information is adequate and acceptable to explain how the proposed blocking devices will be commercially dedicated.

The licensee stated in this LAR that the blocking devices are included to prevent the ADS and IRWST injection valves from opening if a CCF occurs in the PMS during the normal operation. However, whenever there is an actual LOCA, it is required by the safety functions in the certified design to remove the blocking function, so the coolant can be injected into the reactor coolant system. As shown in the revised Figure 7.2-1, Sheets 15, 16, and 19 of 21 of the UFSAR in the LAR, the blocking signal is removed if any of the following interlock input signals are true: (1) low CMT upper narrow range (NR) level, (2) low battery charger input voltage (for the battery charger used to charge the Class 1E battery bank), (3) manual switch on the Secondary Dedicated Safety Panel in the unblock position, and (4) RSW operation enabled MCR/RSW transfer switch in the remote shutdown room (RSR) position. Therefore, these four signals are logically implemented by using “OR” gate in the circuitry of the ADS and IRWST injection blocking device in each division. The output of this “OR” logic gate is used to remove the blocking signal to the CIMs used to actuate the injection valves.

The staff evaluated each proposed interlock input signal to assure that the LAR captures proper indicators for a LOCA and assures removal of the blocking function in the appropriate circumstances. The staff noted that the CMTs will not drain if their discharge valves are inadvertently opened under normal operating pressure conditions. In this case, any water leaving the CMTs will be replenished through the connection from the RCS cold leg to the top of the CMT. However, the staff finds that if there is any LOCA, the water level of the CMT which is connected to the reactor coolant system will drop. From this observation the staff concludes that the CMT water level is a good indicator of an actual LOCA. The staff also observed that there is an ADS timer in the current PMS logic, which causes an actuation of the ADS on low battery charger input voltage. The timer circuit causes an actuation of the ADS after a certain amount of time has passed since receiving the low battery charger input voltage signal. Hence, it is necessary to remove the ADS and IRWST injection blocking signal for a low battery charger input voltage to allow the timer circuit to actuate the ADS following a prolonged loss of alternating current (ac) power. The operator manually removes the ADS and IRWST injection blocking signals to permit manual actuation of the ADS and IRWST injection valves. This would be necessary in the event that automatic actuation fails. The manual unblock is also used during shutdown modes when it is permissible to have less than two CMTs operable. Manual removal of the blocking signal and also actuation of the ADS and IRWST injection from the RSW may be needed if the MCR is not habitable. Each divisional MCR/RSW transfer switch removes the blocking function so that actuation from the RSW is possible. Based on the evaluation of the system, the staff finds that the four interlock signals added to remove the blocking signals for the ADS and IRWST injection are adequate and acceptable in order to maintain the safety function to cool the reactor system if there is a LOCA occurring.

The staff further evaluated each proposed interlock input signal to assure that the systems would function as described in the LAR and as required by the safety functions in the certified design.

First, the staff evaluated if the required independence between the PMS divisions is still maintained for the proposed blocking devices. The staff observed that there is one ADS and IRWST injection blocking device per PMS division. Each blocking device will be physically located within one of the two PMS BCCs. The blocking devices with Class 1E will cover both

ADS and IRWST injection actuation for each of the PMS divisions. Each blocking device will provide output signals to the component interface module (CIM) that control the ADS and IRWST injection valves assigned to the respective division. The staff finds that there are no inter-divisional connections between the blocking devices, and therefore the independence criterion between the PMS divisions is still met for the proposed blocking devices.

Second, the staff evaluated the proposed changes to assure that the existing safety functions are still maintained during loss of power accidents. The staff noted that the blocking devices for the ADS and IRWST injection valve actuation are physically located within the PMS BCCs in the proposed design changes; however, the PMS and the blocking devices only share input and output connections and a power source. The staff also observed that the ADS and IRWST injection blocking devices are independent of the PMS failure modes that could lead to a spurious injection valve actuation. The preferred failure mode of the PMS on loss of power is to not actuate its engineered safety feature (ESF) outputs. Therefore, the staff finds that a loss of power will not cause a spurious actuation even though it would remove the blocking signals.

Third, the staff evaluated the changes proposed by the licensee to use the CMT water level to remove the blocking function when the CMT water level falls below a setpoint. The staff noted that both the PMS and blocking devices use the two upper NR CMT level signals. However, the staff observed that the sharing of these signals will not compromise the independence of the blocking function nor will it lead to a spurious actuation of ADS or IRWST injection because these signals are continuously monitored by comparison to redundant measurements on the same tank by other divisions. For ADS and IRWST injection squib valves, a CMT low level signal itself does not cause an actuation. Other signals, such as a low pressurizer signal, would need to be present to initiate an actuation. Therefore, the staff finds that the use of the two upper NR CMT level signals are acceptable for the blocking devices.

Fourth, the staff evaluated the proposed changes to include the low battery charger input voltage signal to remove the blocking function of the block devices. The low battery charger input voltage signal is used to charge the Class 1E battery bank. The staff noted that the battery charger input under-voltage relay inputs are also shared by the PMS and the blocking devices. The relays send an under-voltage signal to both the PMS and the blocking devices. An ADS and IRWST injection unblocking function occurs on low battery charger input voltage via the blocking device. A low battery charger input voltage also causes a timer to start and, after 22 hours, the ADS injection valves are opened by the PMS. Therefore, the staff finds that there is no credible failure mode that could request the opening of the ADS injection valves yet prevent the blocking devices from unblocking.

Fifth, the staff evaluated if the proposed blocking devices would have the same potential software CCF which could cause the spurious actuation of the ADS and IRWST injection valves. The staff noted that conventional analog components are proposed to be used for the blocking devices, so the blocking devices do not rely on software for operation and therefore would not have the software CCF. The blocking device receives two 4-20 mA input signals. This includes one signal from each of the two CMT NR upper level sensors. The PMS and the blocking devices share input and output connections and a power supply only. All other components are separate. The blocking device is independent of the PMS processor hardware and software. Therefore, the staff finds that with the proposed changes in the LAR incorporated into the licensing basis, the PMS would still meet the regulatory requirements in 10 CFR Part 50 Appendix A, GDC 22 “Protection System Independence.”

Sixth, the staff noted that the failure of one blocking device would prevent the removal of a blocking signal from the CIM port with highest priority for a single ADS or IRWST injection valve. However, a failure of a blocking device dry contact output would not affect more than one of the ADS or IRWST injection valves. Because the ADS Stage 1, 2, and 3 valves are routed in parallel to each other, a failure to unblock one valve would not prevent ADS Stage 1, 2, and 3 from performing the depressurization design function. The IRWST injection valves are also in parallel to each other; therefore, a failure to unblock one IRWST injection valve would not prevent IRWST injection. An ADS Stage 4 valve can be unblocked by two PMS divisions. Therefore, if one divisional blocking device fails to unblock an ADS Stage 4 valve when required, the other PMS division will unblock it. Furthermore, there are three other ADS Stage 4 valves that would be available for depressurization. The blocking feature can be manually reinstated when a plant startup is in progress, ADS valves are closed, and both CMTs are operable. Therefore, the staff concludes that the proposed blocking devices are designed with appropriate fail-safe principles in that the majority of failures would either cause the blocking function to be removed as a consequence of the failure, or would not prevent the blocking function from being removed when any of the inputs go below a threshold value.

Finally, the staff evaluated the proposed changes to ensure that the requirements on completion of protective action are met as required in Clause 5.2 of IEEE Std. 603-1991. In order to prevent the potential for an automatic reintroduction of the blocking function after an initiation of the ADS and IRWST injection, the licensee included a set/reset (S/R) latch logic gate in the PMS logic, as shown in revised Figure 7.2-1 Sheet 19 of 21 in the UFSAR. The S/R latching logic gate latches the output in the unblocked state even if the inputs to the blocking device return to blocking conditions. The staff concludes that the design feature of the blocking devices in the PMS logic meets the requirements in Clause 5.2 of IEEE Std. 603-1991 on completion of protective action, which requires the protection system to be designed so that the intended sequence of protective actions continues until completion.

In summary, the staff finds that the proposed design details for ADS and new blocking devices for IRWST injection valves for the PMS in this LAR will not adversely affect the functionality of the ADS and IRWST injection valves. The ADS valves would continue to function together with the passive core cooling system (PXS) and IRWST to satisfy the LOCA performance requirements and provide effective core cooling after a LOCA from the time of PXS actuation through the long-term cooling mode. The PXS CMT water level instrumentation would continue to provide NR level channels for actuation of ADS valves and for actuation of the IRWST injection into the direct vessel injection lines for LOCA. The ADS, PXS, and IRWST would continue to adequately perform their design functions as described in the current licensing basis. The blocking device is independent of the PMS failure modes that could lead to a spurious valve actuation. The shared power source and input and output connections do not compromise the independence of the blocking device. The proposed blocking devices are located within the PMS BCCs and are included in the PMS EQ. So, with the proposed changes, the PMS still meets the regulatory requirements in IEEE Std. 603-1991 and 10 CFR Part 50 Appendix A, GDC 22 “Protection System Independence.” The PMS will continue to work as designed in the certified AP1000 DCD. Therefore, with regard to the I&C components of the change, the staff finds the proposed design details for ADS injection blocking devices and new blocking devices for IRWST injection valves in the PMS acceptable.

3.2.2 Evaluation of Technical Specification Changes

In accordance with 10 CFR 50.36, “Technical specifications,” the TS impose limits, operating conditions, and other requirements upon reactor facility operation for the public health and

safety. The TS are derived from the analyses and evaluations in the safety analysis report. In general, TS must include: (1) safety limits and limiting safety system settings; (2) limiting conditions for operation (LCO); (3) surveillance requirements (SRs); (4) design features; and (5) administrative controls. 10 CFR 50.36(c)(2)(ii) provides criteria for establishing limiting conditions for operation (LCO) within the TS.

In the LAR, the licensee proposed adding blocking device LCO requirement LCO 3.3.20, "Automatic Depressurization System and In-containment Refueling Water Storage Tank Injection Blocking Device" to Appendix A of the COL. The staff evaluated this proposed TS for the operability of unblocking function provided by the ADS and IRWST injection blocking devices, and determined it is required by Criterion 3 of 10 CFR 50.36(c)(2)(ii) to address the proposed changes in the LAR.

The ADS and IRWST injection blocking device receives one CMT upper NR level input from each of the two CMTs. The blocking device unblocks if one CMT level sensor falls below the setpoint. Therefore, if one of the CMTs is not operable, the divisional blocking device only has one CMT level transmitter to perform its blocking/unblocking function and would lose its redundancy within its division. COL Appendix A TS 3.5.2, "Core Makeup Tanks – Operating" allows for less than two CMTs to be operable in Modes 4 with RCS cooling provided by the RNS. As such, in these modes of operation, the CMT level automatic unblocking function of the ADS and IRWST blocking device is not required to be operable. In these modes of operation, TS Table 3.3.20-1, Surveillance Requirement (SR) 3.3.20.2 requires the manual unblocking switch to be in the "unblock" position.

The staff determined that the under-voltage relay ADS actuation timer itself does not satisfy the criteria of 10 CFR 50.36(c)(2)(ii) and the licensee did not propose a TS related to this issue. Therefore the staff determined that no TS should be added for the under-voltage relay ADS actuation timer and its inputs to the blocking device.

The staff determined that ability of the MCR-to-RSW transfer switch to automatically unblock the ADS and IRWST injection blocking device does not necessitate additional action by the operator when transferring control from the MCR to the RSW. Existing TS 3.3.18, "Remote Shutdown Workstation," SR 3.3.18.1 includes a demonstration that the ADS and IRWST injection blocking function is automatically unblocked by the RSW transfer switch. Therefore, staff concluded that an additional TS is not necessary to address this concern.

TS 3.3.20 LCO: Four divisions of the blocking device are required to be operable.

Applicability: TS 3.3.20, as proposed by the licensee, includes the addition of Table 3.3.20-1 to Appendix A of the COL to show the applicability of the blocking device. The device is required to be capable of automatic and manual unblocking in various plant modes.

- Table 3.3.20-1, Function 1 requires the blocking device to be operable for automatic unblocking during modes where two CMTs are required to be operable. This includes Mode 1, Mode 2, Mode 3, and Mode 4 with the RCS not being cooled by the RNS. The blocking device operability for automatic unblocking is not required if the blocking switch is in the unblock position.

- Table 3.3.20-1, Function 2 requires the ADS and IRWST injection block switches to be operable for manual unblocking during Modes 1, 2, 3, 4, 5, and 6. This aligns with the Applicability for the manual actuation functions for ADS and IRWST injection required by

LCO 3.3.9, “Engineered Safety Feature Actuation System Manual Initiation,” which requires the function of the manual unblock switches to enable the manual actuation of ADS and IRWST injection. In Mode 4 with the RCS being cooled by the RNS, in Mode 5, and Mode 6, ADS and IRWST injection block switches are required to be in the unblock position. This requires the block switches to be in the unblock position whenever TS 3.5.2 allows for less than two CMTs to be operable.

Actions: Actions are added to put the system in the appropriate configuration if the appropriate conditions are not met. The actions associated with the TS address a situation where one or more divisions of the ADS and IRWST injection blocking devices for automatic or manual unblocking are inoperable. In this condition, the affected division is required to be unblocked within 8 hours. If this does not occur within the associated completion time, then the affected ADS and IRWST injection valves will be declared inoperable. Declaring the affected valves inoperable allows the supported system Actions (i.e., for ADS and IRWST inoperable valves) to dictate the required measures. The ADS and/or IRWST LCO(s) provide appropriate actions for the inoperable components.

Surveillance Requirements (SRs): SRs are added to perform a channel check, channel operational test, channel calibration, verification of ADS and IRWST injection block switch position, actuation logic test at various frequencies, and trip actuating device operational test. CMT surveillance requirements are also referenced for their impact on operability. The following surveillance requirements are included with this TS to periodically check the ability of the blocking device to automatically and manually unblock:

- **SR 3.3.20.1** requires performance of a channel check once every 12 hours. This surveillance is a comparison of the parameter indicated on one CMT upper NR level channel to a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value. Significant deviations between the two instrument channels could be an indication of excessive instrument drift in one of the channels. A channel check will detect gross channel failure. The 12 hour surveillance frequency is based on operating experience that demonstrates that channel failure is rare.

- **SR 3.3.20.2** verifies the position of the block switches are in the unblock position once every 7 days when the plant is in Mode 4 with the RCS being cooled by the RNS, in Mode 5, and Mode 6. This prevents the blocking of ADS and IRWST injection when there may be reduced or no capability for automatic unblocking from CMT level. The 7 day surveillance frequency is adequate considering the availability of MCR status monitoring of the block signal.

- **SR 3.3.20.3** requires the performance of a channel operational test every 92 days. It confirms that the block is removed when CMT level drops below the appropriate setpoint. The 92 day surveillance frequency is based on WCAP-10271, “Evaluation of Surveillance Frequencies and Out of Service Times for the Reactor Protection Instrumentation System, June 1996,” Supplement 2. WCAP-10271 concludes analog channel testing can be conducted quarterly (i.e., 92 days) instead of monthly. Furthermore, the proposed channel operational test and channel calibration surveillances are required to be in accordance with the Setpoint Program required by TS 5.5.14. The justification for using a quarterly frequency is based on two points:

  (1) The general insensitivity of engineered safety feature unavailability to

failures in analog channels.

2) The generally insignificant increase in the core melt frequency and radiation exposure by using a quarterly frequency instead of a monthly frequency. In addition, WCAP-10271, Supplement 1, lists various benefits of performing analog channel testing at a quarterly interval instead of a monthly interval.

- **SR 3.3.20.4** requires performance of a channel calibration every 24 months. It is a complete check of the instrument loop. The 24 month surveillance frequency is based on operating experience and consistency with the refueling cycle.

- **SR 3.3.20.5** requires performance of an actuation logic test for automatic unblocking every 24 months. This test, in conjunction with ESF actuation logic test (i.e., SR 3.3.15.1 and SR 3.3.16.1), overlaps the ADS and IRWST injection functional tests (i.e., SR 3.4.11.4, SR 3.4.11.5, and SR 3.5.6.9) that verify actuation on an actuation signal, to provide complete testing of the safety function. The surveillance frequency of 24 months is based on the need to perform this SR during periods in which the plant is shut down for refueling to prevent any additional risks associated with inadvertent operation of the ADS and IRWST injection valves.

- **SR 3.3.20.6** requires performance of a trip actuating device operational test of the blocking device manual switch every 24 months. The surveillance frequency is based on the known reliability of the manual switch functions and has been shown to be acceptable through operating experience. The SR is modified by a Note that states verification of setpoint is not required, since these functions have no setpoint associated with them.

- **SR 3.3.20.7** requires performance of LCO 3.5.2 Surveillances associated with ensuring CMTs are capable of injecting to the RCS. As stated above, CMT injection supports the operability of the ADS and IRWST injection blocking devices for automatic unblocking. All four divisions of ADS and IRWST injection blocking devices are inoperable if one or both CMTs are inoperable for injection. Therefore, SRs 3.5.2.3, 3.5.2.6, and 3.5.2.7 are required to be met.

The TS changes do not adversely affect any function or feature used for the prevention and mitigation of accidents or their safety analyses, and do not adversely affect any allowable value or design analysis. The staff finds the changes to the TS acceptable for the same reasons discussed earlier in section 3.2 of this SE. The above TS changes are consistent with the changes proposed to the UFSAR. The licensee stated that the TS bases will be changed to be consistent with the proposed TS.

3.2.3 Evaluation of Mechanical Changes

In the LAR the licensee describes the primary function of the PXS as providing emergency core cooling following postulated design-basis events for VEGP Units 3 and 4. The PXS provides RCS makeup and boration during transients or accidents where the normal RCS makeup supply from the chemical and volume control system is lost or is insufficient. The PXS provides safety injection to the RCS to provide adequate core cooling for the complete range of LOCA events. The PXS consists of two CMTs, an IRWST, a passive residual heat removal heat exchanger, two accumulators, and other supporting equipment. The PXS includes pyrotechnic-actuated (squib) valves that open to initiate gravity-driven injection of core cooling water from the IRWST

to the reactor vessel.

During a design-basis event, the ADS in VEGP Units 3 and 4 will reduce the RCS pressure to allow the PXS to provide gravity-driven core cooling water from the IRWST to the reactor vessel. The ADS includes four stages of valves with Stages 1, 2 and 3 consisting of motor-operated valves, and Stage 4 consisting of pyrotechnic-actuated (squib) valves. The specific stages of ADS valves are designed to open automatically based on CMT levels and time delays to provide a controlled depressurization of the RCS. By depressurizing the RCS, the ADS allows lower pressure injection sources, such as the IRWST, to perform their safety injection functions.

The licensee proposes changes to the licensing basis documents to add design detail for the ADS blocking device, and to add the blocking device to the design of the IRWST injection squib valve actuation logic. VEGP Units 3 and 4 UFSAR 7.3.1.2.4.1, "Block to Prevent ADS Spurious Actuation," provides the current description of the blocking device used to reduce the potential for spurious actuations of the ADS valves. The LAR specifies that the ADS blocking device will prevent a spurious actuation of the four stages of ADS valves, and a subsequent release of reactor coolant to containment, which could occur as a result of a potential software CCF. The LAR also specifies that a blocking device and new PMS logic will be applied to the IRWST injection squib valves to prevent spurious IRWST injection valve opening, which could also result in a loss of reactor coolant. The LAR indicates that there is one ADS and IRWST injection blocking device per PMS division. These Class 1E devices cover both ADS and IRWST injection actuation for each of the PMS divisions. Each blocking device will provide output signals to the CIMs that control the ADS and IRWST injection valves assigned to the respective division.

The LAR indicates that the ADS and IRWST injection blocking devices are designed to block ADS and IRWST injection actuation unless the relevant plant parameters indicate that an actual LOCA event is occurring. The LAR specifies the input signals that will remove the blocking signals for the ADS and IRWST injection actuation. These input signals include low CMT level, low battery charger input voltage, manual reactor operator position switch, and RSW transfer switch. When the ADS and IRWST injection actuation block is removed, the ADS and IRWST injection valves are permitted to open.

The NRC staff finds the input signals to remove the ADS and IRWST injection actuation block to be acceptable. In its evaluation, the staff considered that the ADS and IRWST injection actuation will be unblocked when the water level in either CMT falls below a setpoint that is above that used by the PMS to actuate the ADS Stages 1, 2, 3, and 4, and IRWST injection valves. The ADS and IRWST injection actuation will also be unblocked in the event of low battery charger input voltage in preparation for ADS actuation in response to low battery charger input voltage. In addition, the ADS and IRWST injection actuation will be unblocked by manual operation of a position control switch in the MCR or by transfer of control from the MCR to the RSW.

When the blocking signals are removed, the ADS valves and the IRWST injection valves are capable of mechanical operation to perform their specific safety functions. In particular, the ADS valves will be allowed to open in their proper sequence to provide the four stages of depressurization of the RCS. In addition, the IRWST injection squib valves in the PXS will be allowed to open to provide gravity-driven flow of water from the IRWST to cool the reactor core. The NRC staff finds that the removal of the blocking signals will allow the four stages of the ADS valves and IRWST injection squib valves to perform their specific safety functions.

Based on the above evaluation, the staff finds the mechanical aspects of the modifications proposed by the licensee in LAR-16-018 for blocking devices in the ADS and IRSWT injection actuation logic to avoid spurious actuations of the ADS and IRWST injection valves in VEGP Units 3 and 4 to be acceptable.

3.2.4 Evaluation of Reactor System Changes

The staff reviewed the proposed changes to the text of UFSAR Section 6.3, Subsection 6.3.2.2.8.9. In the LAR, the licensee proposed changes to add design detail to the ADS injection blocking device and to add the blocking device to the design of the IRWST injection squib valves actuation logic potentially affecting the prior approved safety analysis in UFSAR Chapter 15. After evaluation of the LAR and supplemental information provided by the licensee, the staff finds that proposed changes would not affect any function or feature used for the prevention and mitigation of accidents or their safety analyses.

For the Tier 2 text changes proposed for UFSAR Section 6.3, the staff found that no safety-related SSC or function would be involved. The proposed changes would not involve nor interface with any SSC accident initiator or initiating sequence of events related to the accidents evaluated in the plant-specific DCD or UFSAR. The proposed changes would not affect the radiological source terms (i.e., amounts and types of radioactive materials released, their release rates and release durations) used in the accident analyses. No system or design function or EQ would be adversely affected by the proposed changes. The changes would not result in a new failure mode, malfunction, or sequence of events that could adversely affect a radioactive material barrier or safety-related equipment. The proposed changes 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 could result in significant fuel cladding failures. The proposed changes would not adversely affect any design code limit allowable value, design analysis, nor would they adversely affect any safety analysis input or result, or design/safety margin. Based on the staff's review of the LAR, the staff concludes the safety analysis in UFSAR Chapter 15 remains unchanged.

3.2.5 Evaluation of Human Factor Engineering Changes

This LAR would allow the licensee to add additional information regarding the ADS and IRWST injection blocking devices to the licensing basis for the AP1000.

In an RAI response dated February 23, 2017 (ADAMS Accession No. ML17054D204), the licensee indicated that the human-system interface (HSI) necessary to perform the ADS/IRWST unblock functions has not changed since the initial integrated system validation (ISV) which previously tested the ability of operators to use the ADS/IRWST unblock controls in an integrated manner during performance based scenario testing.

Although details of the ADS/IRWST unblock HSI were not in the licensing basis at the time of the design certification, the functions were installed in the simulator prior to initial ISV testing.[2]

[2] The NRC conducted an inspection of the verification and validation process (including the ISV process) in October 2016 (ADAMS Accession No. ML16336A244). The inspection concluded that Westinghouse had adequately followed the verification and validation process described in the approved design certification application.

Operators conducting ISV testing used the ADS/IRWST unblock HSI to perform the unblock functions during the tests. Based on that, the licensee stated in the February 23, 2017 RAI response that the LAR does not change the design tested during the ISV. After review, the staff agrees that this LAR does not change any previously validated HSIs, nor does it change previously validated operator actions. Therefore, the staff concludes that no new testing is necessary to support this LAR.

NRC previously reviewed and approved the Westinghouse ISV process (APP-OCS-GEH-320 "AP1000 Human Factors Engineering Integrated System Validation Plan") as part of the design certification process. The approved ISV process requires some retesting of scenarios in which operators experienced challenges during the initial integrated system validation testing. This retesting has not yet occurred, therefore the ISV process is not considered complete at the time of this review and SE.

The AP1000 design certification uses ITAAC to confirm that the approved human factors implementation plans have been followed while designing and constructing the MCR. Several ITAAC address the successful completion of verification and validation testing (No. 739-743 ITAAC No. 3.2.00.01a-e). Human Performance, Operator Licensing and ITAAC Branch will inspect certain ITAAC (specifically Nos. 742 and 743) to ensure that the results were generated using the approved verification and validation process and that the results support safe operation.

Given the partially complete status of the entire ISV process, the HSI used to remove the ADS/IRWST block functions added by this LAR will be validated in the same manner as the rest of the MCR HSI. Since the ADS/IRWST unblock HSI has been subject to the same ISV testing as the rest of the MCR HSI, the staff concludes that successful closure of the ISV ITAAC is sufficient to prove that this control can be safely used.

Based on the considerations discussed above, the staff finds the proposed changes to be acceptable.

3.2.6 Evaluation of Probabilistic Risk Assessment Changes

The licensee proposes changes to the licensing basis documents to add design detail for the ADS blocking device and to add a blocking device to the IRWST injection squib valve actuation logic. The ADS and IRWST injection blocking devices are designed to prevent spurious actuations of the ADS and IRWST injection valves due to a potential software CCF in the PMS. The LAR indicates that there is one ADS and IRWST injection blocking device per PMS division. These Class 1E devices cover both ADS and IRWST injection actuation for each of the PMS divisions. Each blocking device will provide output signals to the CIMs that control the ADS and IRWST injection valves assigned to the respective division.

The proposed changes would not be reflected in the plant-specific PRA that was used to license the plant because they are subsumed within a more general basic event. The staff evaluated the change qualitatively and agrees that the impact on total risk is very small and that the proposed change reduces risk. For these reasons, the staff finds the proposed change acceptable. Before loading fuel, the plant-specific PRA will be upgraded and updated, at which time this design change will be evaluated for its impact on the plant-specific PRA. Both the hardware configuration and human actions will be considered and, if appropriate, will be

modeled.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations in 10 CFR 50.91(b)(2), the designated Georgia State official was notified of the proposed issuance of the amendment. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20, “Standards for Protection Against Radiation.” Based on the staff’s evaluation and conclusions discussed above, the staff determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (*Federal Register*, 81 FR 92873, dated December 20, 2016). Additional information provided by letters dated February 23, 2017 and dated May 9, 2017, did not change the NRC staff’s original proposed No Significant Hazard Consideration Determination. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

Because the exemption is necessary to allow the changes proposed in the license amendment, and because the exemption does not authorize any activities other than those proposed in the license amendment, the environmental consideration for the exemption is identical to that of the license amendment. Accordingly, the 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), no environmental impact statement or environmental assessment needs to be prepared in connection with the issuance of the exemption.

6.0 CONCLUSION

The staff has determined that pursuant to Section VIII.A.4, Appendix D to 10 CFR Part 52, the exemption (1) is authorized by law, (2) presents no undue risk to the public health and safety, (3) is consistent with the common defense and security, (4) is a special circumstance that outweighs the reduction in standardization, and (5) does not significantly reduce the level of safety at the licensee’s facility. Therefore, the staff grants the exemption from Tier 1 information as specified by the licensee.

The staff has concluded, based on the considerations discussed in Section 3 and after confirmation that the changes proposed in this LAR do not change an analysis methodology or assumptions, that there is reasonable assurance that: (1) the health and safety of the public will not be endangered by operation in the proposed manner, (2) there is reasonable assurance that 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. Therefore, the staff finds the changes proposed in this license amendment acceptable.

7.0 REFERENCES

1. Southern Nuclear Operating Company, Vogtle Electric Generating Plant Units 3 and 4, "Request for License Amendment and Exemption: ADS and IRWST Injection Block (LAR-16-018)," dated October 14, 2016 (ADAMS Accession No. ML16288A810).

2. Southern Nuclear Operating Company, Vogtle Electric Generating Plant Units 3 and 4, "Supplement to Request for License Amendment and Exemption: ADS and IRWST Injection Block (LAR-16-018S1)," dated February 23, 2017 (ADAMS Accession No. ML17054D204).

3. Southern Nuclear Operating Company, Vogtle Electric Generating Plant Units 3 and 4, "Supplement to Request for License Amendment and Exemption: ADS and IRWST Injection Block (LAR-16-018S2)," dated May 9, 2017 (ADAMS Accession No. ML17129A589).

4. Vogtle Electric Generating Plant Units 3 and 4, Updated Final Safety Analysis Report, Revision 5, dated June 24, 2011 (ADAMS Accession No. ML11180A100).

5. AP1000 Design Control Document, Revision 19, dated June 13, 2011 (ADAMS Accession No. ML11171A500).

6. Combined License NPF-91 for Vogtle Electric Generating Plant Unit 3, Southern Nuclear Operating Company (ADAMS Accession No. ML14100A106).

7. Combined License NPF-92 for Vogtle Electric Generating Plant Unit 4, Southern Nuclear Operating Company (ADAMS Accession No. ML14100A135).