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ND-12-1988
10 CFR 50.90
10 CFR 52.63

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555-0001

Southern Nuclear Operating Company
Vogtle Electric Generating Plant Units 3 and 4
Request for License Amendment and Exemption:
Changes to the Chemical and Volume Control System (CVS) (LAR-12-011)

Ladies and Gentlemen:

In accordance with the provisions of 10 CFR 50.90, Southern Nuclear Operating Company (SNC), hereby requests an amendment to the combined licenses (COLs) for Vogtle Electric Generating Plant (VEGP) Units 3 and 4 (License Numbers NPF-91 and NPF-92, respectively). This amendment request proposes to depart from approved Design Control Document (DCD) Tier 2 material that has been previously incorporated into the VEGP Units 3 and 4 updated final safety Analysis Report (UFSAR) and the associated material that has been included in Appendix C of each COL. Therefore, in accordance with the provisions of 10 CFR 52.63(b)(1), an exemption from elements of the design as certified in the 10 CFR Part 52, Appendix D, design certification rule is also requested for the plant-specific DCD Tier 1 material departures.

The proposed departures consist of changes to plant-specific Tier 1 (and COL Appendix C) and Updated Final Safety Analysis Report (UFSAR) text, tables and figures to: (1) Add a bypass line and pressure relief around the air-operated Reactor Coolant System (RCS) Purification Return Line Stop Valve, (2) Replace the CVS zinc addition inboard containment isolation lift check valve with an air operated globe valve and add a thermal relief valve, and (3) Separate the zinc and hydrogen injection paths and relocate the zinc injection point. Enclosure 1 provides the description, technical evaluation, and regulatory evaluation (including the Significant Hazards Consideration determination) for the proposed changes. Enclosure 2 provides the background and supporting basis for the requested exemption. Enclosure 3 provides markups depicting the requested changes to the plant-specific Tier 1, Unit 3 and 4 COL Appendix C, and UFSAR tables and figures. This letter contains no regulatory commitments.

SNC requests staff approval of the license amendment and associated exemption by March 27, 2013, to support installation of the first ring of the Unit 3 containment vessel. Delayed approval of this license amendment could result in a delay in the installation of the containment vessel.

SNC expects to implement the proposed amendment (through incorporation into the licensing basis documents; e.g., the plant-specific DCD and COL Appendix C) within 30 days of approval of the requested changes. 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. Wesley A. Sparkman at (205) 992-5061.

Mr. C. R. Pierce Ms. Amy G. Aughtman states that he is the Regulatory Affairs Director she is a Licensing Manager of Southern Nuclear Operating Company, is authorized to execute this oath on behalf of Southern Nuclear Operating Company and to the best of his her knowledge and belief, the facts set forth in this letter are true.

Respectfully submitted,

SOUTHERN NUCLEAR OPERATING COMPANY

C. R. Pierce A. G. Aughtman

CRP/TEA/kms AGA/TEA/kms

Sworn to and subscribed before me this _____ day of _____, 2012

Notary Public: _____

My commission expires: _____

Enclosures:
1. Vogtle Electric Generating Plant (VEGP) Units 3 and 4 – Request for License Amendment Regarding Changes to the Chemical and Volume Control System (LAR-12-011)
2. Vogtle Electric Generating Plant (VEGP) Units 3 and 4 – Exemption Request Regarding Changes to the Chemical and Volume Control System
3. Vogtle Electric Generating Plant (VEGP) Units 3 and 4 – Proposed Changes to Licensing Basis Documents (LAR-12-011)

cc: To be provided by SNC ND Licensing Admin

Southern Nuclear Operating Company

ND-12-1988

Enclosure 1

Vogtle Electric Generating Plant (VEGP) Units 3 and 4

Request for License Amendment Regarding Changes to the Chemical and Volume Control System (LAR-12-011)

Table of Contents

Pursuant to 10 CFR 50.90, Southern Nuclear Operating Company (SNC) 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.

SNC requests staff approval of the license amendment and associated exemption by March 27, 2013, to support installation of the first ring of the Unit 3 containment vessel. Delayed approval of this license amendment could result in a delay in the installation of the containment vessel.

1. Summary Description

The proposed changes would change the design of the facility in regard to the Chemical and Volume Control System (CVS) by (1) adding a bypass line and pressure relief around the air-operated Reactor Coolant System (RCS) Purification Return Line Stop Valve (CVS-PL-V081), (2) replacing the CVS zinc addition inboard containment isolation lift check valve (CVS-PL-V094) with an air-operated globe valve and adding a thermal relief valve (CVS-PL-V098), and (3) separating the zinc and hydrogen injection paths and relocating the zinc injection point. The changes require a departure from the Updated Final Safety Analysis Report (UFSAR) Table 3.2-3, Table 3.6-3, Table 3.9-12, Table 3.9-16, Table 3.11-1, Table 3I.6-2 Table 3I.6-3, Table 6.2.3-1, Figure 7.2-1, Figure 7.3-2, Section 9.3.6.3.7, Section 9.3.6.7, Table 9.3.1-1, Table 9A-2, and Figure 9.3.6-1, which also require a departure from the plant-specific Tier 1 Table 2.3.2-1, Table 2.3.2-2, Figure 2.2.1-1, and Figure 2.3.2-1 along with the corresponding changes to COL Appendix C. This enclosure requests approval of the license amendment necessary to implement this change.

2. Detailed Description

CVS Over-Pressure Protection

Under the current design, the CVS RCS Purification Return Line Stop Valve (CVS-PL-V081) provides a design function of isolating flow in the charging line to the Reactor Coolant System (RCS). Upon loss of power, the actuator for CVS-PL-V081 fails to the open position which allows the valve to act as a check valve. In addition, CVS-PL-V081 provides over pressure protection for the Regenerative Heat Exchanger (RHX) by providing a relief path to the RCS. However, a valve that performs all of the above design functions is not commercially available. Consequently, a design change is proposed that would remove the RHX over pressure protection design function from CVS-PL-081 and assign this design function to a new Makeup Return Line Bypass Check valve (CVS-PL-067).

Under the current design, the CVS nonsafety-related design function of diverting CVS flow into the Passive Core Cooling System (PXS) for filling and chemistry adjustments is accomplished inside containment by closing a manual valve (CVS-PL-V068). To avoid making containment entries at power, the proposed design would remove the manual valve and revise procedural controls to close CVS-PL-V081 and the Auxiliary Pressurizer Spray Valve Isolation Valve (CVS-PL-V084), thus preserving the nonsafety-related design

function. As a result, in the bypass line, manual valve CVS-PL-V068 will be removed. In addition CVS-PL-V069 is replaced with CVS-PL-067.

To avoid the potential of gas accumulation in the makeup return bypass line, the bypass line will be repositioned from above the main line to below the main line.

The CVS design changes represent design changes which maintain the existing UFSAR design functions. An ASME Code Section III valve and a thermal relief valve will maintain the flow isolation design function (UFSAR Section 9.3.6.3.7) and preserve the Reactor Coolant System (RCS) pressure boundary safety function (UFSAR Section 5.2.1.3 Alternative Classification), as well as provide the engineering design function of RHX over-pressure protection.

The CVS RCS Purification Return Line Stop Valve (CVS-PL-V081) isolates the flow in the charging line to the RCS. This valve also provides a relief path to the RCS to protect the RHX from over-pressurizing due to thermal expansion in the event letdown continues with an inadvertent closure of the Auxiliary Pressurizer Spray Isolation Valve (CVS-PL-V084). The CVS Makeup Stop Valve is designed to fail open to maintain this relief path.

The addition of the bypass line with the Makeup Return Bypass Check Valve (CVS-PL-V067) would provide the pressure relief function with an enclosed spring housing suitable for a closed discharge suction application. CVS-PL-V081 is normally open and can be closed from the Main Control Room or Remote Shutdown Room to isolate the charging downstream of the RHX.

Under the current design, the CVS nonsafety-related design function of diverting CVS flow into the Passive Core Cooling System (PXS) for filling and chemistry adjustments is accomplished by closing a manual valve (CVS-PL-V068) inside containment. To avoid making containment entries at power, the proposed design would remove the manual valve and revise procedural controls to close CVS-PL-V081 and CVS-PL-V084, thus preserving the nonsafety-related design function.

To maintain the nonsafety-related design function of diverting CVS flow into the Passive Core Cooling System (PXS) for filling and chemistry adjustments, procedural controls will be added to close or confirm closure of CVS valves CVS-PL-V081 and CVS-PL-V084. CVS-PLV-081 is shown in its system configuration in UFSAR Figure 9.3.6-1 (sheet 1) and satisfies the functional, ASME code, equipment qualification and In-Service Testing (IST) criteria for CVS pressure boundary and containment isolation valves. The bypass line will be repositioned to a position below the main process line to the RCS in order to prevent hydrogen accumulation.

The CVS design functions to isolate the charging line flow to the RCS from the RHX and provide RHX over pressure protection are unchanged. Valves that meet the requirements for CVS-PLV-081 are commercially unavailable. Therefore, design changes, including operating procedure changes, CVS line repositioning, deletion of two valves in the bypass line, and the addition of a spring-assisted check valve in the repositioned bypass line are proposed to provide the RHX over pressure protection function while maintaining RCS flow isolation functions. The valves and piping continue to meet existing UFSAR ASME requirements. For CVS-PL-V067, a welded ASME Section III spring-assisted check valve will be provided, which will lift with a 515 pressure differential across the seat providing a maximum inlet pressure of 3000 psig. This will meet the integrated overpressure

protection requirement of Article NC-7120 by providing a system design that does not exceed 3100 psig.

Applicable Tier 2 Text, Table and Figure Departure Changes

Tier	UFSAR Departure	Description of Proposed Change
UFSAR Tier 2	Table 3.2-3	Add CVS-PL-V067, Makeup Return Line Bypass Check Valve, requirements
UFSAR Tier 2	Table 3.9-12	Add CVS-PL-V067, Makeup Return Line Bypass Check Valve, to the list of ASME Class 1, 2 and 3 active valves
UFSAR Tier 2	Table 3.9-16	Add new valve CVS-PL-V067, Makeup Return Line Bypass Check Valve, to the valve in-service test requirements list and revise Notes 6 and 32 to add CVS-PL-V067
UFSAR Tier 2	Table 3.11-1	Add CVS-PL-V067, Makeup Line Bypass Check Valve, to the list of environmentally qualified electrical and mechanical equipment
UFSAR Tier 2	Table 3I.6-3	Add CVS-PL-V067, Makeup Return Bypass Check Valve, to the list of AP1000 safety-related electrical and mechanical equipment that is not high frequency sensitive
UFSAR Tier 2	Figure 9.3.6-1	Delete valves CVS-PL-V068 and CVS-PL-V069, add new valve CVS-PL-V067, and reorient the bypass line below the main process line downstream of the Auxiliary Pressurizer Spray Line Isolation Valve (CVS-PL-V084) connection to the main process line. [Note: Valves CVS-PL-V068 and CVS-PL-V069, as well as the bypass line, were added inadvertently in DCD Rev 19 only to this figure, so no tables were affected and only the valves have to be deleted and the bypass line repositioned.]

Associated Tier 1 Departure:

Tier	UFSAR Departure	Description of Proposed Change
UFSAR Tier 1	Table 2.3.2-1	Add CVS-PL-V067, Makeup Return Line Bypass Check Valve, requirements

Isolation Valve Type change

The CVS design changes include lift check valve replacement with an air operated globe valve (CVS-PL-V094) and the addition of a pressure relief valve (CVS-PL-V098). This

change to an air operated globe valve is preferred because the zinc injection system uses a positive displacement pump which would result in the containment isolation check valve experiencing more cycles than desirable, resulting in high maintenance rates. The addition of a pressure relief valve is required to perform the over pressure relief function previously performed by the check valve. This change represents design enhancements while maintaining the existing design functions. An ASME Code Section III seismically qualified air operated valve and a thermal relief valve will maintain the containment isolation boundary and preserve the RCS pressure boundary safety functions. The CVS design function includes a safety related containment isolation function because portions of the zinc injection (zinc "addition" used interchangeably) flow path originates outside the containment. In addition, the reactor coolant pressure boundary (RCPB) integrity retention design function requires addressing pressure relief from thermal overpressure conditions, such as the zinc addition flow path at the containment penetration boundary. There is no affect on the zinc injection UFSAR design functions which are to reduce radiation fields and to reduce the potential for crud-induced power shift (CIPS) within the RCS.

The CVS zinc addition inboard containment isolation lift check valve replacement with an air operated globe valve (CVS-PL-V094) provides a more suited valve for this application. The design, analysis, installation, testing and qualification, including seismic qualification requirements, are addressed along with the identical outboard air-operated valve (AOV) (CVS-PL-V092) on the same line. Valve closure logic associated with containment isolation or Low-1 pressurizer level which provides diverse and redundant capability, identical to CVS-PL-092 logic, is added to CVS-PL-V094. The AOV normally will be open and can be opened or closed via the Plant Control System (PLS) soft level controls, from the Main Control Room (MCR) or Remote Shutdown Room (RSR), and CVS-PL-V094 will close automatically upon a PMS manual Low-1 pressurizer level or automatic containment isolation signal. Administrative opening of the AOV cannot occur while the isolation signal exists. As with CVS-PL-V001, CVS-PL-V002, and CVS-V003, the valve is interlocked to close via the PMS upon a CVS isolation signal or automatically by a purification line isolation signal.

The new thermal relief valve (CVS-PL-V098), added inside the containment between the inboard and outboard zinc isolation valves, provides the overpressure protection previously provided by the lift check valve and provides the same type of overpressure protection design configuration that is applied and has been approved in similar AP1000 containment isolation valve locations.

The additional shutoff interlocks for CVS-PL-V094, which are below the level of detail in the UFSAR, protect the zinc addition pump (CVS-MP-02).

These changes do not affect the zinc addition design function of reducing radiation fields and reducing the potential for crud-induced power shift (CIPS) within the RCS. (UFSAR Section 9.3.6.2.3.3) The CVS-PL-V094 change from a lift type check valve to an AOV for flow isolation does not affect the design function because it still can perform the flow isolation function, including the added automatic valve controls, and is identical in valve type and function to the outboard isolation valve (CVS-PL-V092), which performs flow isolation on the line. Because of the low process flow conditions this engineering design improvement change addresses potential lift check valve flutter maintenance and replacement concerns. With the replacement of the check valve, which also provided

thermal pressure relief for this penetration, a common thermal pressure relief valve (CVS-PL-V098) design configuration is added.

Applicable Tier 2 Text, Table and Figure Departure Changes

Tier	UFSAR Departure	Description of Proposed Change
UFSAR Tier 2	Table 3.2-3	Add CVS-V098, Zinc~~/Hydrogen~~ Addition Line Containment Isolation Thermal Relief Valve, requirements
UFSAR Tier 2	Table 3.9-12	Add CVS-V098, Zinc~~/Hydrogen~~ Addition Line Containment Isolation Thermal Relief Valve, requirements
UFSAR Tier 2	Table 3.9-16	Revise CVS-V094, Zinc Injection Containment Isolation IRC, requirements from lift check valve to AOV (include Safety Functions change 'Active' to 'Active-to-Failed' and add CVS-V098 'Zinc~~/Hydrogen~~ Addition Line Containment Isolation Thermal Relief Valve' and requirements, including under "Valve/Actuator Type" column "Thermal Relief"
UFSAR Tier 2	Table 3.11-1	Revise CVS-V094 from check valve to AOV 'Hydrogen Addition Containment Isolation' to 'Zinc Injection Containment Isolation IRC' and add Limit Switch CVS-PL-V094-L and Solenoid Valve CVS-PL-V094-S requirements and add CVS-V098 Zinc~~/Hydrogen~~ Addition Line Containment Isolation Thermal Relief Valve' and requirements
UFSAR Tier 2	Table 3I.6-2	Add CVS-V094, Zinc Addition IRC Isolation Valve, and add Limit Switch CVS-PL-V094-L and Solenoid Valve CVS-PL-V094-S
UFSAR Tier 2	Table 3I.6-3	Add CVS-V098, 'Zinc~~/Hydrogen~~ Addition Containment Isolation Thermal Relief Valve, requirements and delete redundant information for CVS-V092 and CVS-V094
UFSAR Tier 2	Table 6.2.3-1	Revise CVS-PL-V094 from check valve to AOV 'Zinc Injection to RCS' requirements and add CVS-PL-V098 thermal relief valve and requirements
UFSAR Tier 2	Figure 7.2-1	Add text to logic box 'Purification Line Isolation' to 'Purification Line and Zinc~~/~~ and Hydrogen Addition IRC Isolation Valve Isolation' to provide isolation function for new IRC AOV CVS-PL-V094 on Low Pressurizer Water Level signal
UFSAR Tier 2	Table 7.3-2	Revise both P12 Pressurizer level below & above setpoint Functions (c) change to "... purification line

Tier	UFSAR Departure	Description of Proposed Change
		isolation and zinc~~/~~ and hydrogen addition IRC isolation valve isolation on low pressurizer…"
UFSAR Tier 2	Table 9.3.1-1	Add CVS-PL-V094, Zinc Isolation Valve and requirements
UFSAR Tier 2	Figure 9.3.6-1	Change CVS-PL-V094 from check valve to AOV, add thermal relief valve CVS-PL-V098
UFSAR Tier 2	Section 9.3.6.3.7	~~Revise text under~~Add new subtitle for "Zinc ~~"Hydrogen~~ Addition Containment Isolation Valve" to describe existing AOV CVS-PL-V092 and new AOV CVS-PL-V094 requirements, including that ~~and add text to identify~~ CVS-PL-V094 closes on PMS low-1 pressurizer signal to be consistent with the logic; add new Subtitle "~~Hydrogen~~Zinc Addition Line Relief Valve" and text to describe new relief valve CVS-PL-V098 function and criteria
UFSAR Tier 2	Section 9.3.6.7	Add under "Purification Isolation" the text "... ~~hydrogen~~ zinc addition line valve inside containment ... ." to add the isolation control function
UFSAR Tier 2	Table 9A-2	Add to 1000 AF 01/~~-~~1100 AF 11~~-~~300B CVS-PL-V094 '~~Hydrogen~~ Zinc Addition Cont. Isolation Valve' for ~~class~~ Class 1~~-~~E ~~division~~ Division A

Associated Tier 1 Departures:

Tier	UFSAR Departure	Description of Proposed Change
UFSAR Tier 1	Figure 2.2.1-1	Revise CVS-PL-V094 inboard containment isolation lift check valve type to AOV and add CVS-PL-V098 pressure relief valve
UFSAR Tier 1	Table 2.3.2-1	Revise CVS-PL-V094 AOV requirements/title and add CVS-PL-V098 pressure relief valve requirements
UFSAR Tier 1	Figure 2.3.2-1	Revise CVS-PL-V094 inboard containment isolation lift check valve type to AOV and add CVS-PL-V098 pressure relief valve

Separate Zinc and Hydrogen Injection Paths

This CVS design improvement provides a separate control and injection capability for hydrogen and zinc addition to better address achieving the historically identified benefits of corrosion reduction, pipe cracking mitigation, and dose reduction. The hydrogen

injection (hydrogen "addition" used interchangeably) UFSAR design function is to control the RCS oxygen concentration, which is produced by radiolysis in the core. Addition of hydrogen minimizes corrosion of the fuel and primary surfaces and during power operation eliminates free oxygen and prevents ammonia formation. The zinc injection (addition) UFSAR design functions are to reduce the radiation fields and the potential for crud-induced power shift (CIPS) within the RCS.

The CVS provides the safety-related containment isolation functions because portions of these hydrogen and zinc subsystems have equipment outside the containment. Prior to the proposed change, containment isolation for hydrogen and zinc is provided by the normally open, failed close outboard isolation valve (CVS-PL-V092) and inboard check valve (CVS-PL-V094). After the proposed change there are separate sets of containment boundary isolation valves, one set for zinc (CVS-PL-V092 globe valve and CVS-PL-V094 check valve) and the other set (CVS-PL-V219 globe valve and CVS-PL-V217 check valve) for hydrogen, each meeting all of the same requirements as the previous zinc/hydrogen configuration. (CVS-PL-V094 is further modified to be a globe valve by the "Isolation Valve Type change," also included in this LAR.) The new hydrogen injection penetration will meet the existing containment boundary requirements, including containment isolation and In-Service Testing (IST), as well as preserving the RCS pressure boundary safety functions using ASME Code Section III qualified valves and piping.

This proposed design change provides separate routing and improved control of the hydrogen and zinc additives within CVS which are then combined in the CVS makeup flow path to the RCS. The hydrogen line addition continues to satisfy the design function of controlling the RCS oxygen concentration within a predictable range of RCS chemistry profiles. Likewise, the zinc addition line continues to satisfy the design functions of reducing the radiation fields and the potential for ~~crud-induced power shift (~~CIPS~~)~~ within the RCS. These changes represent an improvement because the makeup flow temperature for each additive at the injection point better suits each additive and controlling each separately allows batch or continuous injection, which better addresses industry guidelines. The zinc injection point at a cooler location within the CVS Makeup loop provides a balance of trade-offs amongst the probabilities of zinc precipitation, injection point stress corrosion cracking, and potential injection line blockages while satisfying the RCS industry guidelines (i.e., EPRI Report NP-5960-SR, ~~PWR~~ Primary Water Chemistry Guidelines).

Appropriate table entries for CVS-PL-V065 and CVS-PL-V095 into Table 3.2-3 were inadvertently omitted from the approved AP1000 Tier 2 DCD, Rev. 19. This change corrects that omission.

Applicable Tier 2 Text, Table and Figure Departure Changes

Tier	UFSAR Departure	Description of Proposed Change
UFSAR Tier 2	Table 3.2-3	Revise CVS-PL-V092 to Zinc Injection Containment Isolation ORC, revise CVS-PL-V094 to Zinc Injection Containment Isolation IRC, ~~and~~ revise CVS-PL-V096 to Zinc Injection Containment Isolation Test Connection, and revise CVS-PL-V098 Zinc Addition Line Containment Isolation Thermal Relief Valve; and add CVS-PL-V215 Hydrogen Injection – IRC Shutoff and requirements, add CVS-PL-V216 Hydrogen Injection Containment Isolation Test Connection and requirements, add CVS-PL-V217, Hydrogen Injection Containment Isolation Check IRC, requirements; add CVS-PL-V218, Hydrogen Injection Containment Isolation Test Connection requirements; add CVS¬PL-V219, Hydrogen Injection Containment Isolation Check ORC, requirements; Rename CVS-PY-C04 to be CVS-PY-C05 Hydrogen Add Line Containment Penetration and add CVS-PY-C04 Zinc Add Line Containment Penetration and requirements; and add CVS-PL-V065 Zinc Addition – IRC Shutoff and requirements, and add CVS-PL-V095, Zinc Add Containment Isolation Test Connection, requirements
UFSAR Tier 2	Table 3.6-3	Room Number - 11209 Chase for PWR-SGS004, revise 'CVS hydrogen supply piping (L062)' to 'CVS hydrogen supply piping (L215),' for PWR-SGS008 revise 'CVS hydrogen supply piping (L062)' to 'CVS hydrogen supply piping (L215);' Room Number – 11300 for PWR-CVS047 A/B, revise 'CVS hydrogen supply valves (CVS- PL-V065, V094, V095, and V096)' to 'CVS hydrogen supply valves (CVS- PL-V215, V216, V217, and V218)'
UFSAR Tier 2	Table 3.9-12	Revise CVS-PL-V092 'Hydrogen Add Containment Isolation' to 'Zinc Injection Containment Isolation Valve ORC;' revise CVS-PL-V094 'Hydrogen Add IRC Isolation Check Valve' to 'Zinc Injection Containment Isolation Valve IRC;' revise CVS-PL-098 to 'Zinc Addition Line Containment Isolation Thermal Relief Valve,' and add CVS-PL-V217 the Hydrogen Injection Containment Isolation Check Valve IRC' requirements; ~~add CVS-PL-V218 'Hydrogen Injection Containment Isolation Test Connection Valve' requirements,~~ and add CVS-PL-V219 'Hydrogen Injection Containment Isolation Valve ORC' requirements

Tier	UFSAR Departure	Description of Proposed Change
UFSAR Tier 2	Table 3.9-16	Revise CVS-PL-V092 'Hydrogen Addition Containment Isolation' to 'Zinc Injection Containment Isolation ORC;' revise CVS-PL-V094 'Hydrogen Addition IRC Isolation' to 'Zinc Injection Containment Isolation IRC;' revise CVS-PL -V098 to 'Zinc Addition Line Containment Isolation Thermal Relief;' add CVS-PL-V217 'Hydrogen Injection Containment Isolation Check IRC' requirements; and add CVS-PL-V219 'Hydrogen Injection Containment Isolation ORC' requirements
UFSAR Tier 2	Table 3.11-1	Under Active Valves, ~~R~~revise CVS-PL-V092 'Hydrogen Addition Containment Isolation' to 'Zinc Injection Containment Isolation;' revise CVS-PL-V094 'Hydrogen Addition Containment Isolation' to 'Zinc Injection Containment Isolation ~~I~~-RC';~~'~~ revise CVS-PL-V098 'Zinc/Hydrogen Addition Line Containment Isolation Thermal Relief Valve' to 'Zinc Injection Containment Isolation Thermal Overpressurization Relief Valve';~~'~~ add CVS-PL-V217 'Hydrogen Injection Containment Isolation IRC' requirements; and CVS-PL-V2-19 'Hydrogen Injection Containment Isolation' including Limit Switch and Solenoid Valve requirements. ~~;~~ ~~u~~Under 'Miscellaneous – Non-Active Valves,' add CVS-PL-V215 'Hydrogen Injection – IRC Shutoff' requirements; add CVS-PL-V216 'Hydrogen Add Cont Isolation Test Connection' requirements; ~~add CVS-PL-V217 'Hydrogen Injection Containment Isolation IRC' requirements;~~ add CVS-PL-V218 'Hydrogen Addition Containment Isolation Test Connection' requirements; revise CVS-PL-V065 'H2 Mkup Containment Isolation Thermal Relief Valve' to 'Zinc Addition – IRC Shutoff;' revise CVS-PL-V095 'Hydrogen Add Cont Isolation Test Connection' to 'Zinc Add Cont Isolation Test Connection;' and revise CVS-PL-V096 'Hydrogen Addition Containment Isolation Test Connection' to 'Zinc Addition Containment Isolation Test Connection'
UFSAR Tier 2	Table 3I.6-2	Revise CVS-PL-V092 'Hydrogen Addition Containment Isolation' to 'Zinc Addition Containment Isolation;' revise CVS-PL-V094 'Hydrogen Addition IRC Isolation Valve' to 'Zinc Addition IRC Isolation Valve' and add CVS-PL-V219 'Hydrogen Injection Containment Isolation' identification of Limit Switch CVS-PL-V219-L and Solenoid Valve CVS-PL-V219-S
UFSAR Tier 2	Table 3I.6-3	Revise CVS-PL-V092 ~~-~~'Hydrogen Addition Containment Isolation' to 'Zinc Addition Containment Isolation;' revise CVS-PL-V094 'Zinc/Hydrogen Addition IRC Isolation Valve' to 'Zinc Addition Containment

Comment [x1]: Revised per reviewer comment.

Tier	UFSAR Departure	Description of Proposed Change
		Isolation;' revise CVS-PL-V098 to 'Zinc Injection Containment Isolation Thermal Overpressurization Relief Valve;' add CVS-PL-V217 'Hydrogen Injection Containment Isolation Check Valve' requirement; add CVS-PL-V218 'Hydrogen Injection Containment Isolation Test Connection Valve requirement; CVS-PL-V219 'Hydrogen Addition Containment Isolation requirement; revise CVS-PL-V058 'Line Line Containment Isolation Relief' to 'Letdown Line Containment Isolation Relief;' revise CVS-PL-V065 'H2 Mkup Containment Isolation Thermal Relief Valve' to 'Zinc Addition – IRC Shutoff; revise CVS-PL-V095 'Hydrogen Add Cont Isolation Test Connection' to 'Zinc Add Cont Isolation Test Connection;' revise CVS-PL-V096 'Hydrogen Addition Containment Isolation Test Connection' to 'Zinc Addition Containment Isolation Test Connection'
UFSAR Tier 2	Table 6.2.3-1	Revise CVS-PL-V092, CVS-PL-V094 and CVS-PL-V098 'H2 injection to RCS' to 'Zinc injection to RCS' requirements; and add CVS-PL-V217 and CVS-PL-V219 'Hydrogen injection to RCS' requirements
UFSAR Tier 2	Figure 7.2-1	Revised text in logic box "Purification Line and Zinc/Hydrogen Addition IRC Isolation Valve Isolation" to "Purification Line and Zinc and Hydrogen Addition Lines Isolation Valve Isolation" to provide isolation function for both zinc and hydrogen containment isolation valves (except hydrogen IRC check valve CVS-PL-V21 7) on Low Pressurizer Water Level signal
UFSAR Tier 2	Table 7.3-2	Revise both P12 Pressurizer level below and above setpoint Functions (c) from "... and zinc/hydrogen addition IRC isolation valve isolation ... " to "... and zinc and hydrogen addition isolation valves isolation ... "
UFSAR Tier 2	Table 9.3.1-1	Revised CVS-PL-V092 'Hydrogen Addition Containment Isolation' to 'Zinc Injection Containment Isolation ORC;' revise CVS-PL-V094 'Zinc Isolation Valve' to 'Zinc Injection Containment Isolation Valve IRC;' add CVS-PL-V219 Hydrogen Injection Containment Isolation' requirements
UFSAR Tier 2	Figure 9.3.6-1	Rename (from "H2 Addition" to "Zinc Addition") the input to CVS-PL-V092 and CVS-PL-V094, and connecting the output from CVS-PL-V094 to the shell side inlet line of the Regenerative Heat Exchanger (RHX); add new hydrogen addition injection through new CVS-PL-V219, then the new containment penetration, then new CVS-PL-V217, and then connecting to the RHX shell side

Tier	UFSAR Departure	Description of Proposed Change
		output between CVS-PL-V080 and CVS-PL-V081
UFSAR Tier 2	Section 9.3.6.3.7	Revise subtitle for "Hydrogen Addition Containment Isolation Valve" to be "… Valves" and describe the CVS-PL-V219 globe valve outside containment isolation and the CVS-PL-V217 check valve inside containment isolation functions, as well as the PMS controls for closure of the outside containment isolation valve, including the low-1 pressurizer level signal for closure.
UFSAR Tier 2	Section 9.3.6.7	Under the "Purification Isolation" header, add the text, "… zinc addition line valve inside containment and the hydrogen addition line valve outside containment …" to add the isolation control function, and under the "Containment Isolation" header, add the text, "… and the hydrogen and zinc addition lines."
UFSAR Tier 2	Table 9A-2	For Fire Area/Fire Zone ~~Revise~~ 1000 AF 01/1100 AF 11300B, revise CVS-PL-V094 to be 'Hydrogen Addition Cont. Isolation Valve,' and for Fire Area/Fire Zone ~~'V094' to 'V217,' and~~ 1201 AF 05, revise Hydrogen Addition Cont. Isolation Valve from 'V092' to 'V219' and add CVS-PL-V092, 'Zinc Injection Cont. Isolation Valve," and properties.

Associated Tier 1 Departures:

Tier	UFSAR Departure	Description of Proposed Change
UFSAR Tier 1	Figure 2.2.1-1	Rename the function of containment penetration P08 from 'CVS-H2 Injection' to 'CVS-Zinc Injection,' and the addition of containment penetration P09 for the purpose of CVS H2 Injection, with valve CVS-PL-V217 inside containment and valve CVS-PL-V219 outside containment
UFSAR Tier 1	Figure 2.3.2-1	Rename (from "H2 Addition" to "Zinc Addition") the input to CVS-PL-V092 and CVS-PL-V094, and connect the output from CVS-PL-V094 to the shell side inlet line of the Regenerative Heat Exchanger (RHX). Add new hydrogen addition injection through new CVS-PL¬V219, then the new containment penetration, then new CVS-PL-V217, and then connecting to the RHX shell side output between CVS-PL-V080 and CVS-PL-V081
UFSAR	Table 2.3.2-1	Change CVS-PL-V092 from 'Hydrogen Addition Line

Tier	UFSAR Departure	Description of Proposed Change
Tier 1		Containment Isolation Valve' to 'Zinc Injection Containment Isolation Valve ORC'
		Change CVS-PL-V094 from 'Hydrogen Addition Line Containment Isolation Valve' to 'Zinc Injection Containment Isolation Valve IRC'
		Change CVS-PL-V098 from 'Zinc/Hydrogen Addition Line Ctmt Isol Thermal Relief Valve' to 'Zinc Addition Line Ctmt Isol Thermal Relief Valve'
		Add CVS-PL-V217, Hydrogen Injection Containment Isolation Check Valve IRC, requirements, and add CVS-PL-V219, Hydrogen Injection Containment Isolation Valve ORC, requirements
UFSAR Tier 1	Table 2.3.2-2	Add CVS Hydrogen Injection Containment Penetration Lines L213, L214, and L217 and requirements and change the description for Line L061 to CVS Zinc Injection Containment Penetration Line

3. Technical Evaluation

The CVS controls the RCS chemistry, purity and inventory by performing the major functions of purification, chemical shim and chemical control, oxygen control, filling and pressure testing the RCS, borated makeup to the auxiliary equipment, and pressurizer auxiliary spray (Tier 1 DCD Section 2.3.2 and Tier 2 UFSAR Section 9.3.6).

The safety functions provided by CVS are limited to containment isolation of CVS lines penetrating containment, termination of inadvertent RCS boron dilution, isolation of makeup on a steam generator or pressurizer high level signal, and preservation of the RCS pressure boundary, including isolation of normal CVS letdown from the RCS (Tier 2 UFSAR Section 9.3.6.1.1).

Supporting Technical Details

CVS Over-Pressure Protection

The CVS design changes represent design changes which maintain the existing UFSAR design functions. Two ASME Code Section III valves will maintain the flow isolation design function (UFSAR Section 9.3.6.3.7) and preserve the RCS pressure boundary safety function (UFSAR Section 5.2.1.3 Alternative Classification), as well as provide the engineering design function of RHX over-pressure protection.

The CVS RCS Purification Return Line Stop Valve (CVS-PL-V081) isolates the flow in the charging line to the RCS. This valve also provides a relief path to the RCS to protect the RHX from over-pressurizing due to thermal expansion in the event letdown continues with an inadvertent closure of the Auxiliary Pressurizer Spray Isolation Valve (CVS-PL-V084). The CVS Makeup Stop Valve is designed to fail

open, so that this relief path will remain available. These design functions are not changed.

The addition of the bypass line with the Makeup Return Bypass Check Valve (CVS-PL-V067) would provide the pressure relief function with an enclosed spring housing suitable for closed discharge suction application.

Under the current design, the CVS nonsafety-related design function of diverting CVS flow into the Passive Core Cooling System (PXS) for filling and chemistry adjustments is accomplished by closing a manual valve (CVS-PL-V068) inside containment. To avoid making containment entries at power, the proposed design would remove the manual valve and revise procedural controls to close CVS-PL-V081 and CVS-PL-V084, thus preserving the nonsafety-related design function.

CVS-PLV081 is shown in its system configuration in UFSAR Figure 9.3.6-1 (sheet 1) and satisfies the functional, ASME code, equipment qualification and In-Service Testing (IST) criteria for CVS pressure boundary and containment isolation valves. The layout optimization involves repositioning the bypass line to a position below the main process line to the RCS in order to prevent hydrogen accumulation.

The CVS design functions to isolate the charging line flow to the RCS from the RHX and provide RHX over pressure protection are unchanged. Valves that meet the requirements for CVS-PLV-081 are commercially unavailable. Therefore, design changes, including operating procedure changes, CVS line repositioning, deletion of two valves in the bypass line, and the addition of a spring-assisted check valve in the repositioned bypass line are proposed to provide the RHX over pressure protection function while maintaining RCS flow isolation functions. The valves and piping continue to meet existing UFSAR ASME requirements. The valves and piping continue to meet existing UFSAR ASME requirements. For CVS-PL-V067, a welded ASME Section III spring-assisted check valve will be provided, which will lift with a 515 pressure differential across the seat providing a maximum inlet pressure of 3000 psig. This will meet the integrated overpressure protection requirement of Article NC-7120 by providing a system design that does not exceed 3100 psig.

The design changes including changes to operating procedures and methods of control related to CVS-PL-V081 and CVS-PL-V084 are consistent with existing UFSAR statements regarding the methods by which the design function will be accomplished (UFSAR Section 9.3.6.2).

The UFSAR Tier 2 Appendix 19B analysis relative to ex-vessel severe accident assessment is not affected.

These design changes do not adversely affect the design functions of the CVS system. These design changes do not involve an adverse change to the method of evaluation for establishing design bases or safety analyses. They do not represent a change to a design feature credited in the ex-vessel severe accident assessment. Tests, experiments, and procedures described in the licensing basis are unchanged by this activity.

Isolation Valve Type change

The CVS design changes which make up this design package includes lift check valve replacement with an air operated globe valve (CVS-PL-V094) and addition of a pressure relief valve (CVS-PL-V098). This change package represents design improvements while maintaining the existing design functions. An ASME Code Section III seismically qualified air operated valve and a thermal relief valve will maintain the containment isolation boundary and preserve the RCS pressure boundary safety functions. The non-safety CVS contains some safety related containment isolation functions because portions of the zinc injection (zinc "addition" used interchangeably) flow path originates outside the containment. In addition, the reactor coolant pressure boundary (RCPB) integrity retention design function requires addressing pressure relief from thermal overpressure conditions, such as the zinc addition flow path at the containment penetration boundary. There is no affect on the zinc injection UFSAR design functions to reduce the radiation fields and the potential for crud-induced power shift (CIPS) within the RCS.

The CVS zinc addition inboard containment isolation lift check valve replacement with an air operated globe valve (CVS-PL-V094) provides a more suitable valve for this application. The design, analysis, installation, testing and qualification, including seismic qualification requirements are addressed along with the identical outboard AOV (CVS-PL-V092) on the same line. Valve closure logic associated with containment isolation or Low-1 pressurizer level to provide diverse and redundant capability is added, just like that already provided for the outboard valve, to isolate this CVS purification path from the RCS. The AOV normally will be open and can be opened or closed via PLS soft level controls, from the MCR or RSR, and it will close automatically upon a PMS manual Low-1 pressurizer level or automatic containment isolation signal. Administrative opening of the AOV cannot occur while the isolation signal exists. As with CVS-PL-V001, CVS-PL-V002, and CVS-V003, the valve is interlocked to close via the PMS upon a CVS isolation signal or automatically by a purification line isolation signal.

The new thermal relief valve (CVS-PL-V098), added inside the containment between the inboard and outboard zinc isolation valves, provides the overpressure protection previously provided by the lift check valve and replicates, with the thermal relief valve, the same type of overpressure protection design configuration that is applied and has been approved in multiple similar AP1000 containment isolation valve locations.

These changes do not affect the zinc addition design function of reducing radiation fields and reducing the potential for crud-induced power shift (CIPS) within the RCS. The CVS-PL-V094 change from a lift type check valve to an AOV for flow isolation does not affect the design function because it still can perform the flow isolation function, including the added automatic valve controls, and is identical in valve type and function to the outboard isolation valve (CVS-PL-V092), including the automatic valve controls, which performs flow isolation on this same line. Because of the low process flow conditions this engineering design improvement change addresses potential lift check valve flutter maintenance and replacement concerns. With the replacement of the check valve, which also provided thermal pressure relief for this penetration, a common thermal pressure relief valve (CVS-PL-V098) design configuration is added. This common flow isolation valve penetration configuration with thermal relief valve does not introduce any new failure concerns because the

isolation valve failure modes of open, close and leakage remain the same, with the pressure relief into the containment from this small line bounded by existing analysis of relief from much larger lines and this small (1 in.) process line configuration is not considered PRA significant because it is below the 2 in line threshold for reevaluation. (Reference APP-GW-GL-022, Section 24.5) These design and engineering improvement changes, do not adversely affect the design functions as described in the plant-specific UFSAR.

While these design and engineering improvement changes modify the method of control for isolation and pressure relief they utilize widely utilized common equipment configurations that do not represent a change to procedures or method of control that adversely affects the performance of a design function.

The UFSAR Tier 2 Appendix 19B analysis relative to ex-vessel severe accident assessment is not affected.

These changes, do not adversely affect the design function of the CVS system. The departure does not involve an adverse change to the method of evaluation for establishing design bases or safety analyses. It does not represent a change to a design feature credited in the ex-vessel severe accident assessment. Tests, experiments, and procedures described in the licensing basis are unchanged by this activity.

Separate Zinc and Hydrogen Injection Paths

This CVS design improvement provides a separate control and injection capability for hydrogen and zinc addition to better address achieving the historically identified benefits of corrosion reduction, pipe cracking mitigation, dose reduction, etc. The hydrogen injection (hydrogen “addition” used interchangeably) UFSAR design function is to control the RCS oxygen concentration, which is produced by radiolysis in the core. Addition of hydrogen minimizes corrosion of the fuel and primary surfaces and during power operation eliminates free oxygen and prevents ammonia formation. The zinc injection (addition) UFSAR design functions are to reduce the radiation fields and the potential for crud-induced power shift (CIPS) within the RCS.

The non-safety CVS contains some safety-related containment isolation functions because portions of these hydrogen and zinc subsystems have equipment outside the containment. Currently, containment isolation for hydrogen and zinc is provided by the normally open, failed close outboard isolation valve (CVS-PL-V092) and inboard check valve (CVS-PL-V094). After the proposed change there are separate sets of containment boundary isolation valves, one set for zinc (CVS-PL-V092 globe valve and CVS-PL-V094 check valve) and the other set (CVS-PL-V219 globe valve and CVS-PL-V217 check valve) for hydrogen, each meeting all of the same requirements as the current zinc/hydrogen configuration. (CVSPL-V094 is further modified to be a globe valve by the “Isolation Valve Type change,” also included in this LAR.) The new hydrogen injection path will meet the existing containment boundary requirements, including containment isolation and In-Service Testing (IST), as well as preserving the RCS pressure boundary safety functions utilizing ASME Code Section III qualified valves and piping.

This proposed design change provides separate routing and improved control of the hydrogen and zinc additives within CVS which are then combined in the CVS Makeup flow path to the RCS. The hydrogen addition continues to satisfy the design function of controlling the RCS oxygen concentration within a predictable range of RCS chemistry profiles. Likewise, the zinc addition still satisfies the design functions of reducing radiation fields and reducing the potential for crud-induced power shift (CIPS) within the RCS. These changes represent an improvement because the makeup flow temperature for each additive at the injection point better suits each additive and controlling each separately allows batch or continuous injection, which better addresses industry guidelines. The zinc injection point at a cooler location within the CVS Makeup loop provides a balance of trade-offs amongst the probabilities of zinc precipitation, injection point stress corrosion cracking, and potential injection line blockages while satisfying the RCS industry guidelines (i.e., EPRI Report NP-5960-SR, Primary Water Chemistry Guidelines). Although an additional separate containment penetration is provided for hydrogen this small (1 in.) line is provided with isolation valves meeting the same UFSAR design requirements as the previous injection path (hydrogen/zinc) and this penetration addition is not considered Probability Risk Analysis (PRA) significant because it is below the 2 in. line threshold for reevaluation. (Reference APP-GW-GL-022, Section 24.5) Consequences from hydrogen line failure are not changed from the existing UFSAR design. Therefore, there is no change in the design functions as described in the UFSAR.

While there are changes to the operational method of control with the additional hydrogen isolation valves these are considered to be standard, common controls that do not represent an adverse effect on operation or performance of the design functions. Expansion of operational controls to both batch and continuous injection methodologies is considered to be an improvement requiring less demanding operator control, even though slightly different operational procedures will be used. These changes will continue to meet containment isolation design functions and will improve the performance of the design functions to meet industry chemistry guidelines. However, these changes remain consistent with existing UFSAR statements regarding methods of control and procedures.

The UFSAR Tier 2 Appendix 19B analysis relative to ex-vessel severe accident assessment is not affected.

Appropriate table entries for CVS-PL-V065 and CVS-PL-V095 into Table 3.2-3 were inadvertently omitted from the approved AP1000 Tier 2 DCD. This change corrects that omission.

These design changes do not adversely affect the design functions of the CVS system. These design changes do not involve an adverse change to the method of evaluation for establishing design bases or safety analyses. They do not represent a change to a design feature credited in the ex-vessel severe accident assessment. Tests, experiments, and procedures described in the licensing basis are unchanged by this activity.

4. Regulatory Evaluation

4.1 Significant Hazards Consideration

The proposed changes would revise the Combined Licenses (COLS) for Vogtle electric Generating Plant (VEGP) Units 3 and 4 by revising the Chemical and Volume Control System (CVS) configuration by: 1) Adding a spring-assisted check valve for pressure relief around an air-operated makeup stop valve and reorienting the stop valve bypass line, 2) Replacing the CVS zinc addition inboard containment isolation lift check valve with an air operated globe valve, and 3) Separating the zinc and hydrogen injection paths and relocating the zinc injection point.

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:

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

Response: No

The CVS provides the safety-related function of preserving containment integrity by isolation of the CVS lines penetrating containment. The proposed amendment will enhance the ability of the CVS to perform its nonsafety-related function of injecting hydrogen and zinc to the Reactor Coolant System (RCS), while maintaining the ability of the CVS to perform its safety-related containment isolation function. The proposed amendment will also maintain the CVS function of providing isolation of charging flow to the RCS and providing over pressure protection for the Regenerative Heat Exchanger (RHX). The addition of a spring assisted check valve around an air-operated makeup stop valve and reorienting the stop valve bypass line does not affect the safety-related function of isolating the CVS lines for containment isolation. The components added by this proposed activity, including piping, a spring assisted check valve, an air-operated containment isolation valve, and a thermal relief valve are designed to the same codes and standards as other components addressed in the certified design that perform similar functions. The additional CVS containment penetration is a passive extension of containment and is identical in form, fit, and function to other PSS sampling containment penetrations currently addressed in the certified design. The addition of a new CVS containment penetration will not change the maximum allowable leakage rate allowed by Technical Specifications and is verified periodically in accordance with regulations. Furthermore, the proposed PSS configuration changes will neither impact any accident source term parameter or fission product barrier nor affect radiological dose consequence analysis.

Therefore, the proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

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

Response: No

The air-operated containment isolation valve is similar to other AOVs employed in other applications that serve similar functions. Based on the acceptability of credible failure modes for similar AOVs, it was determined that the use of an AOV for this CVS containment isolation application would not initiate a new type of accident. The additional containment penetration is also similar in form, fit, and function to the other CVS containment penetrations that have been evaluated and found acceptable in the current certified AP1000 plant design. Separating the zinc and hydrogen injection paths and relocating the zinc injection point, the addition of a spring assisted check valve around an air-operated makeup stop valve, and reorienting the stop valve bypass line does not change the intended operation of the CVS, and therefore, does not create any new malfunctions, failure mechanisms, or accident initiators.

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

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

Response: No

The containment isolation function is not changed by this activity and is bounded by the existing design. The proposed CVS containment penetration is similar in form, fit, and function to other containment penetrations in similar applications in the current certified AP1000 plant design. The additional CVS containment penetration is an engineered passive extension of containment, and, therefore, does not affect containment or its ability to perform its design function. The addition of these CVS components, including piping, a spring assisted check valve, an air-operated containment isolation valve, a thermal relief valve and the additional CVS containment penetration do not exceed or alter a design basis or safety limit. Because the containment isolation function, containment leakage rate limit, potential containment leakage, and protective shielding are not changed by this activity and are bounded by the existing design, there is no change to any current margins.

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.

4.2 Applicable Regulatory Requirements/Criteria

CVS Over-Pressure Protection

10 CFR 50, Appendix A, General Design Criterion (GDC) 14 states that "reactor coolant pressure boundary shall be designed, fabricated, erected, and tested so as to have an extremely low probability of abnormal leakage, of rapidly propagating failure, and of gross rupture." The CVS changes maintain compliance with GDC 14 through application of ASME Section III valves for flow isolation and thermal pressure relief (i.e., Article NC-7120.

The CVS has alternative classification criteria, which are applicable to the non-safety portions of the system.

UFSAR Tier 2 Section 5.2.1.3 Alternate Classification

"... A portion of the chemical and volume control system inside containment is not classified as safety-related. The classification of the AP1000 reactor coolant pressure boundary deviates from the requirement that the reactor coolant pressure boundary be classified as safety related and be constructed using the ASME Code, Section III as provided in 10 CFR 50.55a. The safety-related classification of the AP1000 reactor coolant pressure boundary ends at the third isolation valve between the reactor coolant system and the chemical and volume control system ...."

The CVS changes maintain compliance with this alternative classification through application of ASME Section III valves through the third isolation valve between the RCS and the CVS.

10 CFR 50.55a, Code and Standards, identifies criteria which require use of ASME Code Section III valves, In-Service Testing (IST) and IEEE-603 "Criteria for Protection Systems for Nuclear Power Generating Stations" requires Instrumentation and Controls criteria for the instrumentation. The CVS changes maintain compliance by requiring ASME Code Section III qualified valves and piping, as well as containment isolation valve closure logic satisfying IEEE- 603 criteria.

Isolation Valve Type change

10 CFR 50, Appendix A, GDC 2 states that "structures, systems and components important to safety shall be designed to withstand the effects of natural phenomena, such as earthquakes...." The CVS changes maintain compliance with GDC 2 through seismic qualification of the AOV and thermal relief valve, as well as the isolation logics.

10 CFR 50, Appendix A, GDC 14 states that "reactor coolant pressure boundary shall be designed, fabricated, erected, and tested so as to have an extremely low probability of abnormal leakage, of rapidly propagating failure, and of gross rupture." The CVS changes maintain compliance with GDC 14 through application of ASME Section III valves for inboard isolation and thermal pressure relief.

The CVS has alternative classification criteria, which are applicable to the non-safety portions of the system.

UFSAR Tier 2 Section 5.2.1.3 Alternate Classification

> "... A portion of the chemical and volume control system inside containment is not classified as safety-related. The classification of the AP1000 reactor coolant pressure boundary deviates from the requirement that the reactor coolant pressure boundary be classified as safety related and be constructed using the ASME Code, Section III as provided in 10 CFR 50.55a. The safety-related classification of the AP1000 reactor coolant pressure boundary ends at the third isolation valve between the reactor coolant system and the chemical and volume control system ...."

The CVS changes maintain compliance with this alternative classification through application of ASME Section III valves through the third isolation valve between the RCS and the CVS.

10 CFR 50, Appendix A, GDC 55 states that "each line that is part of the reactor coolant pressure boundary and that penetrates primary reactor containment shall be provided with containment isolation valves ... (4) One automatic isolation valve inside and one automatic isolation valve outside containment...." The CVS changes maintain compliance with GDC 55 by having two automatic isolation valves, one inside and one outside containment.

10 CFR 50.55a, Code and Standards, identifies criteria which require use of ASME Code Section III valves, In-Service Testing (IST) and IEEE-603 "Criteria for Protection Systems for Nuclear Power Generating Stations" requires Instrumentation and Controls criteria for the instrumentation. The CVS changes maintain compliance by requiring ASME Code Section III qualified valves and address the IEEE-603 criteria, including the use of diverse and redundant isolation signals.

The piping and valve modifications will continue to satisfy applicable regulatory criteria as identified in the UFSAR and reviewed by the NRC as documented in the FSER. These applicable criteria include ASME requirements which are required under 10 CFR 50.55a Codes and standards.

Separate Zinc and Hydrogen Injection Paths

10 CFR 50, Appendix A, GDC 14 states that "reactor coolant pressure boundary shall be designed, fabricated, erected, and tested so as to have an extremely low probability of abnormal leakage, of rapidly propagating failure, and of gross rupture." The CVS changes maintain compliance with GDC 14 through application of ASME Section III valves and piping for the new hydrogen containment isolation and pressure retention path.

The CVS has alternative classification criteria, which are applicable to the non-safety portions of the system.

> UFSAR Tier 2 Section 5.2.1.3 Alternate Classification
>
> "... A portion of the chemical and volume control system inside containment is not classified as safety-related. The classification of the AP1000 reactor coolant pressure boundary deviates from the requirement that the reactor coolant pressure boundary be classified as safety related and be constructed using the ASME Code, Section III as provided in 10

> CFR 50.55a. The safety-related classification of the AP1000 reactor coolant pressure boundary ends at the third isolation valve between the reactor coolant system and the chemical and volume control system ...."

The CVS changes maintain compliance with this alternative classification through application of ASME Section III valves through the third isolation valve between the RCS and the CVS.

10 CFR 50, Appendix A, GDC 55 states that "each line that is part of the reactor coolant pressure boundary and that penetrates primary reactor containment shall be provided with containment isolation valves ... (4) One automatic isolation valve inside and one automatic isolation valve outside containment...." The CVS new hydrogen containment injection path changes maintain compliance with GDC 55 by having two automatic isolation valves, one inside and one outside containment.

10 CFR 50.55a, Code and Standards, identifies criteria which require use of ASME Code Section III valves, In-Service Testing (IST) and IEEE-603 "Criteria for Protection Systems for Nuclear Power Generating Stations" requires Instrumentation and Controls criteria for the instrumentation. The CVS changes maintain compliance by requiring ASME Code Section III qualified valves and piping, as well as containment isolation valve closure logic satisfying IEEE- 603 criteria.

10 CFR 52, Appendix D, Section VIII and 10 CFR 52.63(b)(1) require NRC approval for Tier 1 information departures. Although this departure does not adversely affect safety, it does involve changes to Tier 1 information. Therefore, NRC approval is required prior to implementing the Tier 1 changes addressed in this departure.

4.3 Precedent

No precedent is identified.

4.4 Conclusions

In conclusion, based on the considerations discussed above, (1) there is 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. The above evaluations demonstrate that the requested changes can be accommodated without an increase in the probability or consequences of an accident previously evaluated, and without a significant reduction in a margin of safety. Having arrived at negative declarations with regard to the criteria of 10 CFR 50.92, this assessment determines that the requested change does not involve a Significant Hazards Consideration

5. Environmental Considerations

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, facility construction and operation following implementation of the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or a 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, SNC evaluation of the proposed amendment has determined that the proposal meets 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 4.1, 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 proposed amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated; (2) the proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated; and (3) the proposed amendment does not involve a significant reduction in a margin of safety. Therefore, 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.

(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 amendment changes to the CVS are (1) Adding a spring assisted check valve around an air- operated makeup stop valve and reorienting the bypass line, (2) Replacing the CVS zinc addition inboard containment isolation lift check valve with an air operated globe valve, and (3) Separating the ~~Z~~zinc and hydrogen injection paths and relocating the zinc injection point. These CVS changes improve the system functions and control to deliver zinc and hydrogen to the Reactor Coolant System (RCS) while maintaining the containment isolation and system pressure relief and control functions. These changes should maintain or reduce the quantities of non-radiological chemicals (zinc and hydrogen) added to the RCS and maintain or improve the effectiveness of these chemicals resulting in maintaining or reducing the radiological effluent quantity releases. These CVS changes are unrelated to any aspects of plant construction or operation that would introduce any changes to effluent types (e.g., effluents containing chemicals or biocides, sanitary system effluents, and other effluents) or affect negatively any plant radiological or non-radiological effluent release quantities. Furthermore, these changes do not diminish the functionality of any design or operational features that are credited with controlling the release of effluents during plant operation. Therefore, it is concluded that the proposed amendment does not involve a significant change in the types or a significant increase in 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 to CVS are (1) Adding a spring assisted check valve around an air-operated makeup stop valve and reorienting the bypass line, (2) Replacing the CVS zinc addition inboard containment isolation lift check valve with an air operated globe valve, and (3) Separating the ~~Zinc~~ zinc and hydrogen injection paths and relocating the zinc injection point. These CVS changes improve the system functions and control to deliver zinc and hydrogen to the RCS while maintaining the containment isolation and system pressure relief and control functions. These changes should maintain or reduce the quantities of non-radiological chemicals (hydrogen and zinc) added to the RCS and maintain or improve the effectiveness of these chemicals resulting in maintaining or reducing the radiological effluent quantity releases. These improvements affecting both non-radiological chemicals, and their controls, and radiological effluent quantity releases, as well as elimination of a manual valve action, in containment, improve or have no effect on individual or cumulative occupational radiation exposure during plant operation. Therefore, it is concluded that the proposed amendment does not involve a significant increase in individual or cumulative occupational radiation exposure.

Based on the above review of the proposed amendment, SNC has determined that the proposed amendment 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 the individual or cumulative occupational radiation exposure. Accordingly, the proposed 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), an environmental impact statement or environmental assessment of the proposed amendment is not required.

6. References

1.) Vogtle Electric Generating Plant (VEGP) Units 3 and 4 Updated Safety Analysis Report (UFSAR), Revision 1, June 2012.

2.) 10 CFR 50.55a, Codes and standards – requiring use of ASME Code

3.) EPRI ALWR Utility Requirements Document, Volume III, Chapter 3: Reactor Coolant System and Reactor Non-Safety Auxiliary Systems (Section 3.3.3.1 References EPRI Report NP-5960- SR, Primary Water Chemistry Guidelines)

Southern Nuclear Operating Company

ND-12-1988

Enclosure 2

Vogtle Electric Generating Plant (VEGP) Units 3 and 4

Exemption Request
Regarding Changes to the Chemical and Volume Control System

1.0 Purpose

SNC requests a permanent exemption from the provisions of 10 CFR 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 (UFSAR). The regulation, 10 CFR 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. Tier 1 includes ITAAC that must be satisfactorily performed prior to fuel load. The design details to be verified by these ITAAC are specified in the text, tables, and figures that are referenced in each individual ITAAC. The Tier 1 departure includes changes to detailed information that supports existing ITAAC, such as changes to valve type designations, line configurations for the Chemical and Volume Control System (CVS), an additional containment penetration, and similar supporting information.

This request for exemption will apply the requirements of 10 CFR 52, Appendix D, Section VIII.A.4 to allow changes to Tier 1 information due to the following proposed changes to the system-based design descriptions and Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) figures and tables:

- Figure 2.2.1-1, Containment System,
  - Rename the function of containment penetration P08 from 'CVS-H2 Injection' to 'CVS-Zinc Injection,' and the addition of containment penetration P09 for the purpose of CVS H2 Injection, with valve CVS-PL-V217 inside containment and valve CVS-PL-V219 outside containment
  - Revise CVS-PL-V094 inboard containment isolation lift check valve type to AOV and add CVS-PL-V098 pressure relief valve
- Table 2.3.2-1
  - Add CVS-PL-V067 requirements
  - Change CVS-PL-V092 from 'Hydrogen Addition Line Containment Isolation Valve' to 'Zinc Injection Containment Isolation Valve ORC'
  - Change CVS-PL-V094 from 'Hydrogen Addition Line Containment Isolation Valve' to 'Zinc Injection Containment Isolation Valve IRC'
  - Change CVS-PL-V098 from 'Zinc/Hydrogen Addition Line Ctmt Isol Thermal Relief Valve' to 'Zinc Addition Line Ctmt Isol Thermal Relief Valve'
  - Add CVS-PL-V217, Hydrogen Injection Containment Isolation Check Valve IRC, requirements, and add CVS-PL-V219, Hydrogen Injection Containment Isolation Valve ORC, requirements
  - Revise CVS-PL-V094 AOV requirements/title and add CVS-PL-V098 pressure relief valve requirements
- Table 2.3.2-2
  - Add CVS Hydrogen Injection Containment Penetration Lines L213, L214, and L217 and requirements and change the description for Line L061 to CVS Zinc Injection Containment Penetration Line ~~Revise CVS-PL-V094 inboard containment isolation lift check valve type to AOV and add CVS-PL-V098 pressure relief valve~~

- Figure 2.3.2-1
    - Rename (from “H2 Addition” to “Zinc Addition”) the input to CVS-PL-V092 and CVS-PL-V094, and connect the output from CVS-PL-V094 to the shell side inlet line of the Regenerative Heat Exchanger (RHX);
    - Add new hydrogen addition injection through new CVS-PL¬V219, then the new containment penetration, then new CVS-PL-V217, and then connecting to the RHX shell side output between CVS-PL-V080 and CVS-PL-V081
    - Revise CVS-PL-V094 inboard containment isolation lift check valve type to AOV and add CVS-PL-V098 pressure relief valve

This request will provide for the application of the requirements for granting exemptions from design certification information, as specified in 10 CFR Part 52, Appendix D, Section VIII.A.4, 10 CFR 52.63, §52.7, and §50.12.

2.0 Background

SNC is the holder of Combined License (COL) Nos. NPF-91 and NPF-92, which authorize construction and operation of two Westinghouse Electric Company AP1000 nuclear plants, named Vogtle Electric Generating Plant (VEGP) Units 3 and 4, respectively. During the detailed design phase of the Chemical and Volume Control System (CVS), departures from AP1000 generic DCD Tier 2 information were determined necessary to improve the functionality of the system to accommodate effective use of zinc and hydrogen injection. This activity requests exemption from the generic DCD Tier 1 tables and figures that support the COL Appendix C ITAAC to allow an accurate reflection of the proposed departures from the associated Tier 2 material.

An exemption from elements of the AP1000 certification (Tier 1) design information to allow a departure to tables and figures referenced in the containment system and chemical and volume control system system-based design descriptions and ITAAC is requested to maintain a consistent level of detail in COL Appendix C, Inspections, Tests, Analyses, and Acceptance Criteria, with the level of detail that is currently provided elsewhere in COL Appendix C and Tier 1 of the plant-specific DCD.

3.0 Technical Justification of Acceptability

CVS Over-Pressure Protection

The CVS design changes represent design changes which maintain the existing UFSAR design functions. Two ASME Code Section III valves will maintain the flow isolation design function (UFSAR Section 9.3.6.3.7) and preserve the Reactor Coolant System (RCS) pressure boundary safety function (UFSAR Section 5.2.1.3 Alternative Classification), as well as provide the engineering design function of RHX over-pressure protection.

Isolation Valve Type change

The CVS design changes which make up this design package includes lift check valve replacement with an air operated globe valve (CVS-PL-V094) and addition of a pressure relief valve (CVS-PL-V098).

As described in the associated License Amendment Request, the proposed departures to the CVS represent an improvement in the functionality of the nonsafety-related functions while maintaining the safety-related functions.

Separate Zinc and Hydrogen Injection Paths

This CVS design improvement provides a separate control and injection capability for hydrogen and zinc addition to better address achieving the historically identified benefits of corrosion reduction, pipe cracking mitigation, dose reduction, etc.

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. Because SNC has identified a need for plant-specific departures from the Tier 1 information related to the Chemical and Volume Control Sampling System as a result of design finalization activities, an exemption to 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)(ii)]; 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.1].

The requested exemption to change the design of the Chemical and Volume Control System 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 52, Appendix D, Section III.B would allow changes to elements of the plant-specific Tier 1 DCD to depart from the AP1000 certified (Tier 1) design information. The plant-specific Tier 1 DCD will continue to reflect the approved licensing basis for VEGP Units 3 and 4 and will maintain a consistent level of detail with that which is currently provided elsewhere in Tier 1 of the plant-specific DCD. Because the changes to the PSS design do not represent any adverse impact to the containment design function, the containment will continue to protect the health and safety of the public in the same manner. Therefore, no adverse

safety impact which would present any additional risk to the health and safety of the public is present. The affected ITAAC in the plant-specific Tier 1 DCD will also continue to provide the detail necessary to support their performance.

Therefore, the requested exemption from 10 CFR 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 exemption from the requirements of 10 CFR 52, Appendix D, Section III.B would change elements of the plant-specific Tier 1 DCD by departing from the AP1000 certified (Tier 1) design information. The exemption does not change the design, function, or operation of any 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 "[a]pplication 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 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.

The proposed changes to the Chemical and Volume Control System facilitate operation by improving operability, reliability, and maintainability of the non-safety related functions while maintaining safety-related functions. Accordingly, this exemption from the certification information will enable the licensee to safely construct, maintain, and operate the AP1000 facility consistent with the design certified by the NRC in 10 CFR Part 52, Appendix D.

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 changes to the plant-specific Tier 1 information and the understanding that these changes are needed to support effective and reliable operation of the Chemical and Volume Control System (CVS), it is likely that this exemption will be requested by other AP1000 licensees. However, if this is not the case, the special

circumstances continue to outweigh any decrease in safety from the reduction in standardization because the key design functions of the Containment System (CNS) and the CVS associated with this request will continue to be maintained. This exemption request and the associated marked-up tables and figure 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.

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 depicting the CVS design changes including an additional containment penetration in the appropriate Tier 1 figures and presenting these CVS changes and their key attributes in the applicable Tier 1 tables. The containment penetration and associated piping and valves are consistent in design and application with containment penetrations already approved as part of the DCD as documented in NUREG-1793 Section 6.2.4. A review of these design changes has determined that they will not have an adverse impact on the design functions associated with the CNS or CVS. Because there is no adverse impact on the design function of these structures, systems, or components (SSCs), there is no reduction in the level of safety.

   Therefore, the design change will not result in a significant decrease in the level of safety.

5.0 Risk Assessment

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

6.0 Precedent

None

7.0 Environmental Consideration

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed exemption does not involve (i) a significant hazards consideration, (i) a significant change in the types or a 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. Specific justification is provided in Section 5 of the corresponding license amendment request. Accordingly, the proposed exemption meets the eligibility criterion 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 with the proposed exemption.

8.0 Conclusion

The proposed changes to Tier 1 are necessary to revise the ITAAC text, tables, and figures in the plant-specific Tier 1 DCD. The license amendment request associated with this proposed exemption revises the plant-specific DCD Tier 1 information by (1) adding a bypass line and pressure relief around the air-operated Reactor Coolant System (RCS) Purification Return Line Stop Valve (CVS-PL-V081), (2) replacing the CVS zinc addition inboard containment isolation lift check valve (CVS-PL-V094) with an air-operated globe valve and adding a thermal relief valve (CVS-PL-V098), and (3) separating the zinc and hydrogen injection paths and relocating the zinc injection point. 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 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 significant decrease in the level of safety, presents special circumstances, does not present a significant decrease in safety as a result of a reduction in standardization, and meets the eligibility requirements for categorical exclusion.

9.0 References

1.) Westinghouse Electric Company, "AP1000 Design Control Document," Revision 19, June 2011.

2.) NUREG-1793, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design," September 2004.