Vogtle PEmails

From: Patel, Chandu
Sent: Thursday, March 15, 2018 11:17 AM
To: Vogtle PEmails
Cc: Patel, Chandu
Subject: Summary of Audit conducted for LAR 17-027, for Vogtle 3 and 4, RCS Vacuum Fill and ITAAC for Containment Flood up
Attachments: LAR 17-027 Audit Summary.docx

Attached is a summary of audit conducted in January 2018 for Vogtle Units 3 and 4 License Amendment Request 17-027 related to Reactor Coolant System Vacuum Fill and ITAAC for Containment Flood-up.

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Hearing Identifier: Vogtle_COL_Docs_Public
Email Number: 237

Mail Envelope Properties (BN7PR09MB25620B170D390DB91FC14D8082D00)

Subject: Summary of Audit conducted for LAR 17-027, for Vogtle 3 and 4, RCS Vacuum Fill and ITAAC for Containment Flood up
Sent Date: 3/15/2018 11:17:12 AM
Received Date: 3/15/2018 11:17:15 AM
From: Patel, Chandu

Created By: Chandu.Patel@nrc.gov

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

Post Office: BN7PR09MB2562.namprd09.prod.outlook.com

Files	Size	Date & Time
MESSAGE	372	3/15/2018 11:17:15 AM
LAR 17-027 Audit Summary.docx	27519	

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

Audit Summary for Vogtle Electric Generating Plant Units 3 and 4
License Amendment Request 17-027
Reactor Coolant System Vacuum Fill and ITAAC for Containment Floodup

A. Background

By letter dated September 27, 2017 Southern Nuclear Operating Company (SNC) submitted license amendment request (LAR)-17-027 requesting changes to technical specifications to allow reactor coolant system (RCS) vacuum fill operations in cold shutdown conditions (Reference 1). As described in LAR-17-027, the proposed change is supported by safety analyses. The purpose of this audit was to gain a better understanding of the analyses supporting LAR-17-027.

B. Regulatory Audit Bases

This regulatory audit was based on the following:

- COL, Appendix C (and Plant –Specific Tier 1) Section 3.3
- UFSAR, Section 6.3.2.2.3
- COL, Appendix A, Technical Specifications, Specification 3.4.12

C. Logistics

The audit was conducted from NRC Headquarters via the Westinghouse electric reading room.

Date: January 22-31, 2018

Location: NRC Headquarters
Two White Flint North
11545 Rockville Pike
Rockville, MD 20852-2738

D. Audit Team Members

Donald Palmrose, Senior Reactor Systems Engineer
Timothy Drzewiecki, Reactor Systems Engineer
Chandu Patel, Senior Project Manager

E. Licensee and Industry Staff Participants

SNC
Wesley Sparkman
Amy Chamberlain

Westinghouse
Camille Zozula

F. Documents Audited

- APP-PXS-M3C-034, Rev. 4, "Containment Flood-up Level," January 8, 2016.

- APP-SSAR-GEF-088, Revision 0, "Small Break LOCA (SBLOCA), Loss of Normal Residual Heat Removal System (RNS) Cooling, and Long Term Core Cooling Mass and Energy Release Assessments of Outstanding Design Debt," September 1, 2016.

G. Description of Audit Activities and Summary of Observations

NRC staff examined calculation APP-PXS-M3C-034, Rev. 4, "Containment Flood-up Level." During this examination NRC staff noted the purpose of the calculation, important inputs into the analysis, and the main results. In particular, NRC staff noted:

- The purpose of the calculation is to determine the initial containment flood levels following actuation of the automatic depressurization system (ADS).
- The calculation evaluated 12 cases and varied multiple parameters, including break location, leak rate, and containment volumes.
- The minimum containment flood-up level is 2.34 meters above nominal (7.68 ft above nominal), where nominal is 100 m or 100 ft depending on units. The minimum flood-up level occurs for a leak originating in the passive core cooling system (PXS) B room of the containment, with a leak rate of 0.00151 m^3/s (24.0 gallons per minute), and the containment volumes set to minimize the containment level.
- The minimum containment flood level corresponds to:
    - A minimum flood-up volume in the normal and PXS B volumes of 1,956.3 m^3 (69,086 ft^3)
    - A best estimate flood-up volume in the normal and PXS B volumes of 1,997.1 m^3 (70,525 ft^3.)
    - A maximum flood-up volume in the normal and PXS B volumes of 2,037.8 m^3 (71,964 ft^3).
- The minimum flood-up level and associated maximum flood-up volume from this analysis are recommend to be used as the basis for ITAAC Table 3.3-6, Item 2.h.

NRC staff examined calculation APP-SSAR-GEF-088, Revision 0, "Small Break LOCA (SBLOCA), Loss of Normal Residual Heat Removal System (RNS) Cooling, and Long Term Core Cooling Mass and Energy Release Assessments of Outstanding Design Debt." This examination was limited to Attachment D, "Shutdown Loss-of-RNS Debt Assessment Evaluation." During this examination NRC staff noted the purpose of the evaluation, important inputs into the analysis, and the main results. In particular, NRC staff noted:

- The evaluation analyzes the loss of the normal residual heat removal system (RNS).
- Analyses were performed using the thermal-hydraulic code NOTRUMP.
- The analysis assumed reduced ADS valve operability in accordance with a proposed update to Technical Specifications (TS). This availability is provided in the table below. provided

	TS 3.4.12			**TS 3.4.13**		
	RCS Configuration	**Flow Paths Operable**		**RCS Configuration**	**Flow Paths Operable**	
		ADS 1-3	**ADS 4**		**ADS 1-3**	**ADS 4**
Current	RCS intact	9 ADS flow paths		RCS open	8 ADS Flow Paths	
					6	2
Expected Update	RCS intact Reactor Subcritical <28 hours	5	4	RCS open Reactor Subcritical <28 hours	5	4
	RCS intact Reactor Subcritical ≥28 hour	3	3	RCS open Reactor Subcritical ≥28 hour	3	3

- Analyses are performed for the following scenarios:
  - MODE 4 and MODE 5, RCS intact, subcritical Less than 28 hours, automatic S-signal.
  - MODE 4 and MODE 5, RCS intact, subcritical Less than 28 hours, manual S-Signal.
  - MODE 4 and MODE 5, RCS intact, subcritical Greater than 28 hours, automatic S-signal
  - MODE 5, subcritical Greater than 28 hours, Vacuum Refill Configuration, automatic ADS actuation
- An analysis was not performed for MODE 5, RCS open, and subcritical less than 28 because this scenario is bounded by previous analysis that assumed fewer ADS valves were available.
- An analysis was not performed for MODE 5, RCS open, and subcritical greater than 28 hours because this scenario is bounded by the vacuum refill analysis due to an earlier depressurization.
- The analysis supporting the RCS vacuum refill configuration credits operator action to actuate ADS based on low hot leg level.

- The analyses for the scenarios with the reactor subcritical for greater than 28 hours, were performed at 24 hours.
- The result of all the analyses showed that the core region remains covered with a two-phase mixture while considering the reduced equipment available to mitigate a loss of RNS cooling in shutdown MODE 4 and MODE 5.

H. Requests for Additional Information Resulting from Audit

This audit did not result in the issuance of any Requests for Additional Information.

I. References

1. “Vogtle Electric Generating Plant, Units 3 and 4 – Request for License Amendment and Exemption Regarding Technical Specifications for Reactor Coolant System Vacuum Fill and Inspections, Tests, Analyses, and Acceptance Criteria for Containment Floodup (LAR-17-027),” September 25, 2017 (ADAMS Accession Number ML17268A188).