UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

August 15, 2018

MEMORANDUM TO: Robert J. Pascarelli, Chief
Plant Licensing Branch 4
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

FROM: Rossnyev D. Alvarado, Acting Chief ***/RA/***
Instrumentation and Controls Branch
Division of Engineering
Office of Nuclear Reactor Regulation

SUBJECT: EICB SAFETY EVALUATION – COMANCHE PEAK NUCLEAR POWER PLANT, UNITS 1 AND 2, LICENSE AMENDMENT REQUEST TO REVISE TECHNICAL SPECIFICATION 3.3.2, "ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION" (CAC/DOCKET/EPID 000976/05000445/L-2018-LLA-0081 and 000976/05000446/L-2018-LLA-0081)

Responsible PM: Margaret Watford
Review Branch: EICB
Review Status: COMPLETE

By letter dated March 29, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18102A516), Vistra Operations Company, LLC (Vistra OpCo, the licensee) submitted a license amendment request (LAR) to revise the Comanche Peak Nuclear Power Plant, Units 1 and 2 (NPF-87 and NPF-89, respectively) Technical Specifications (TS).

The proposed changes would revise TS 3.3.2, "Engineered Safety Feature Actuation System (ESFAS) Instrumentation," by adding a note to Table 3.3.2-1 to change the applicability when the automatic auxiliary feedwater (AFW) actuation due to the trip of all main feedwater (MFW) pumps is required to be operable. In this amendment request, the licensee proposed to modify the Mode 2 applicability so that the AFW actuation is only required to be operable, "[w]hen one or more Main Feedwater Pump(s) are supplying feedwater to steam generators."

The Instrumentation and the Controls Branch (EICB) has reviewed the instrumentation and controls aspects of the requested amendment. The EICB review, as discussed in the enclosed safety evaluation, determined the requested change is acceptable. This memorandum completes EICB review under EPID No. L-2017-LLA-0388.

Enclosure: As stated

CONTACT: Huda Akhavannik, NRR/DE/EICB (301) 415-5253
Norbert Carte, NRR/DE/EICB (301) 415-5890

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NAME:	HAkhavannik	NCarte	RAlvarado
DATE:	07/16/2018	07/16/2018	08/15/2018

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION FOR THE LICENSE AMENDMENT TO REVISE TECHNICAL SPECIFICATION 3.3.2, "ENGINEERED SAFETY FEATURE ACTUATION SYSTEM (ESFAS) INSTRUMENTATION"

VISTRA OPERATIONS COMPANY, LLC

COMANCHE PEAK NUCLEAR POWER PLANT, UNITS 1 AND 2

DOCKET NOS. 50-445 AND 446

1.0 INTRODUCTION

By letter dated March 29, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18102A516), Vistra Operations Company, LLC (Vistra OpCo, the licensee) submitted a license amendment request (LAR) to revise the Comanche Peak Nuclear Power Plant, Units 1 and 2 (NPF-87 and NPF-89, respectively) Technical Specifications (TS).

The proposed changes would revise TS 3.3.2, "Engineered Safety Feature Actuation System (ESFAS) Instrumentation," by adding a note to Table 3.3.2-1 to change the applicability when the automatic auxiliary feedwater (AFW) actuation due to the trip of all main feedwater (MFW) pumps is required to be operable. Currently, the TS Table 3.3.2-1 requires automatic AFW Actuation from a Trip of both MFW Pumps to be operable in Modes 1 and 2. In this amendment request, the licensee proposed to modify the Mode 2 applicability so that the AFW actuation is only required to be operable, "[w]hen one or more Main Feedwater Pump(s) are supplying feedwater to steam generators." This modification of applicability in Mode 2 limits the potential for a low power, overcooling transient due to inadvertent AFW actuation before the main feedwater pumps have established sufficient feed flow.

2.0 REGULATORY EVALUATION

The three subsections below describe: (1) the system being changed, (2) the proposed change, and (3) the regulatory requirements applicable to the change.

2.1 System Description

The AFW System is designed to provide a secondary side heat sink for the reactor in the event that the normal feedwater system is not available. The AFW system has two motor driven pumps and a turbine driven pump. The normal source of water for the AFW System is the condensate storage tank.

The design basis events which impose AFW safety function requirements are: (1) loss of all AC power to plant auxiliaries, (2) loss of normal feedwater, (3) steam generator fault in either the feedwater or steam lines, and (4) small break loss of coolant accidents. These design basis events assume AFW automatically starts on a low-low steam generator level, station blackout, or safety injection. Section 3.0, "Technical Evaluation," of the application states that the anticipatory AFW actuation function, which corresponds to Function 6.g of Table 3.3.2-1, is not credited in the accident analysis.

A trip of all MFW pumps is an indication of a loss of normal feedwater and the subsequent need for some method of heat removal to bring the reactor back to no load temperature and pressure. Each turbine-driven MFW pump is equipped with two pressure switches (one in Train “A” and one in Train “B”) on the oil line for the speed control system. A trip signal from both MFW pumps anticipatory trip circuit would actuate the motor-driven AFW pumps to ensure that at least one steam generator is available with a water supply to act as the heat sink for the reactor.

Section 2.1, “System Design and Operation,” of the application describes the current operation for entering Mode 2 then transitioning to Mode 1. Currently, when entering Mode 2, the AFW system is in service to control and maintain steam generator level through motor-driven AFW pumps. At approximately 2 percent rated thermal power (RTP), a MFW pump is reset and placed into service. During the process of placing one MFW pump in service, the non-operating MFW pump is tripped by the pressure switches, which actuate the motor-driven AFW automatic start on loss of both MFW pumps, thereby placing the anticipatory automatic start circuit in a half trip condition (one-out-of-two inputs to the start logic satisfied). The MFW pump is considered to be in service when its flow is sufficient to maintain steam generator level and the AFW pumps are placed in standby. After entering Mode 1, the second MFW pump is reset and placed into service (approximately at 50 percent RTP), and the anticipatory automatic start circuit is no longer in a half trip condition (i.e., logic is restored to two-out-of-two).

The licensee states in Section 2.3, “Reason for Proposed Change,” of the application that if the first MFW pump being placed into service were to trip while the motor-driven AFW pump has not yet been placed in standby, an AFW automatic start would send a start signal to both motor-driven AFW pumps and cause the flow control valves to the steam generators to "trip-to-auto" which opens them to 100% demand. This results in the potential for a low power, overcooling transient.

2.2 Description of Proposed Change

This amendment requests adding a new footnote “d” to Function 6.g of Table 3.3.2-1, “Engineered Safety Feature Actuation System Instrumentation.” Footnote “d” modifies Mode 2 applicability so that the AFW actuation is required “[w]hen one or more Main Feedwater Pump(s) are supplying feedwater to steam generators.” The associated TS Bases will be updated to state, “Function 6.g must be OPERABLE in MODE 1, and MODE 2 when the MFW pump(s) are feeding the steam generators and the AFW system has been placed in standby for auto-start…In MODE 2, when the MFW pump(s) are not feeding the steam generators, this function is not required as the AFW system is operating to feed the steam generators and does not require the auto-start from this function.”

This amendment requests changes to the limiting conditions for operation (LCOs) with respect to the mode of applicability. In particular, in Mode 2, the AFW actuation is required to be OPERABLE only when the MFW pump(s) are supplying water to the steam generators.

2.3 Applicable Regulatory Requirements

The NRC’s requirements related to the content of the TSs are contained in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Section 50.36. The regulations in 10 CFR 50.36(c) require that the TSs include LCOs. As specified in 10 CFR 50.36(c)(2)(i), LCOs are the lowest functional capability or performance levels of equipment required for safe operation of the facility.

Appendix A to 10 CFR Part 50 list the General Design Criteria for Nuclear Power Plants (GDC):

> GDC 20, "Protection system functions," requires the protection system to be designed to initiate automatically the operation of appropriate systems, to assure that specified acceptable fuel design limits are not exceeded as a result of anticipated operational occurrences.
>
> GDC 22, "Protection system independence," requires that, "[d]esign techniques, such as functional diversity or diversity in component design and principles of operation, shall be used to the extent practical to prevent loss of the protection function."
>
> GDC 29, "Protection against anticipated operational occurrences," requires that protection systems be designed to assure an extremely high probability of accomplishing their functions in the event of anticipated operational occurrences.

3.0 TECHNICAL EVALUATION

3.1 Technical Specification Changes

The amendment requests that the anticipatory AFW automatic start function should not be required to be operable prior to the MFW pump establishing sufficient feed flow to maintain steam generator level and prior to the AFW system being placed in standby for automatic start. That is, this proposed change request removes the anticipatory AFW automatic start function, before the MFW pump is supplying water to the SGs. This is being requested to minimize the possibility of an inadvertent actuation of the AFW automatic start function when it is neither required by plant conditions nor desired for stable plant control.

Section 3, "Technical Evaluation," of the application describes that, if actuated, the automatic start function sends a start signal to both motor-driven AFW pumps and causes the flow control valves to the steam generators to "trip-to-auto," opening them to 100 percent demand. This 100 percent demand flow may not be prudent because during the period of time between entering Mode 2 and the first MFW pump supplying feedwater to steam generators, the motor-driven AFW pumps are already feeding the steam generators with flow controlled by the operator. Therefore, modifying the requirement for automatic start of the motor-driven AFW pumps to be required only when one or more MFW pump(s) are feeding steam generators, limits the potential for an inadvertent AFW actuation thereby limiting the potential for a low power, overcooling transient. In the event of a loss of the MFW pump in Mode 2, an AFW actuation would automatically occur on a low-low SG trip signal for applicable design basis events (DBEs) that require the AFW function to mitigate the event consequences. Therefore, the NRC staff determines that the proposed TS changes continue to meet the 10 CFR 50.36.

3.2 Compliance with GDCs 20, 22, and 29 Requirements

As required by GDC 20, the automatic initiation of an appropriate system is necessary to assure acceptable fuel design limits when normal feedwater flow is lost. For this modification, the automatic start on low-low steam generator water level of the turbine-driven AFW pump assures acceptable fuel design limits are maintained when normal feedwater flow is lost.

As required by GDC 22, to prevent loss of the heat sink protective function, the credited actuation function corresponding to the steam generator low-low water level will actuate the turbine-driven AFW pumps.

As required by GDC 29, the ESFAS continues to maintain functionality in the event of anticipated operational occurrences (when the protective function is needed). Although the auto-start function from the anticipatory motor-driven AFW actuation circuit is removed, it is done while AFW from the motor-driven pumps is already feeding the steam generators. In the event of an operational occurrence, the steam generator low-low water level for the turbine-driven AFW pumps will actuate.

4.0 CONCLUSION

The NRC staff concludes the proposed change to add new footnote “d” to Table 3.3.2-1 is acceptable because it reduces the likelihood of inadvertent overcooling during startup by preventing the automatic start of all AFW pumps with flow control valves opening to 100 percent demand while the flow control is being controlled by the operator prior to the MFW pumps supplying water to the steam generators during Mode 2. Additionally, either operator control or the automatic low-low steam generator water level signal would start the AFW pumps if needed to ensure an adequate secondary side heat sink. Staff finds that this change meets the regulatory requirements described in 10 CFR 50.36 and GDCs 20, 22, and 29 as described in section 2.3 of this SE. Therefore, the staff finds the proposed change acceptable.