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

September 20, 2021

ANO Site Vice President
Arkansas Nuclear One
Entergy Operations, Inc.
N-TSB-58
1448 S.R. 333
Russellville, AR 72802

SUBJECT: ARKANSAS NUCLEAR ONE, UNIT 2 - ISSUANCE OF AMENDMENT NO. 325 RE: REVISE LOSS OF VOLTAGE RELAY ALLOWABLE VALUES AND NUMBER OF DEGRADED VOLTAGE CHANNELS (EPID L-2020-LLA-0193)

Dear Sir or Madam:

The U.S. Nuclear Regulatory Commission (NRC, the Commission) has issued the enclosed Amendment No. 325 to Renewed Facility Operating License No. NPF-6 for Arkansas Nuclear One, Unit 2 (ANO-2). The amendment consists of changes to the Technical Specifications (TSs) in response to your application dated August 25, 2020.

The amendment revises the current 4.16 kilovolt emergency bus undervoltage allowable values contained in ANO-2 TS 3.3.2.1, "Engineered Safety Feature Actuation System Instrumentation," specifically, within Table 3.3-4 to address, in part, information contained in NRC Regulatory Issue Summary 2011-12, "Adequacy of Station Electric Distribution System Voltages," Revision 1, dated December 29, 2011. In addition, the amendment also corrects an error in the number of degraded voltage channels for TS 3.3.2.1, Table 3.3-3, Functional Unit 7.b.

A copy of the related Safety Evaluation is also enclosed. Notice of Issuance will be included in the Commission's monthly *Federal Register* notice.

Sincerely,

/RA/

Thomas J. Wengert, Senior Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-368

Enclosures:
1. Amendment No. 325 to NPF-6
2. Safety Evaluation

cc: Listserv

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

ENTERGY OPERATIONS, INC.

DOCKET NO. 50-368

ARKANSAS NUCLEAR ONE, UNIT 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 325
Renewed License No. NPF-6

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Entergy Operations, Inc. (the licensee), dated August 25, 2020, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Renewed Facility Operating License No. NPF-6 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 325, are hereby incorporated in the renewed license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This amendment is effective as of its date of issuance and shall be implemented prior to startup from Refueling Outage 2R28 (fall 2021) coincident with the necessary plant modifications to be performed in 2R28 to address Regulatory Issue Summary 2011-12.

FOR THE NUCLEAR REGULATORY COMMISSION

Jennifer L. Dixon-Herrity

Digitally signed by Jennifer L. Dixon-Herrity
Date: 2021.09.20 08:41:59 -04'00'

Jennifer L. Dixon-Herrity, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to Renewed Facility
Operating License No. NPF-6
and the Technical Specifications

Date of Issuance: September 20, 2021

ATTACHMENT TO LICENSE AMENDMENT NO. 325

RENEWED FACILITY OPERATING LICENSE NO. NPF-6

ARKANSAS NUCLEAR ONE, UNIT 2

DOCKET NO. 50-368

Replace the following pages of Renewed Facility Operating License No. NPF-6 and the Appendix A, Technical Specifications, with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Renewed Facility Operating License

REMOVE	INSERT
-3-	-3-

Technical Specifications

REMOVE	INSERT
3/4 3-13	3/4 3-13
3/4 3-17	3/4 3-17

(4) EOI, pursuant to the Act and 10 CFR Parts 30, 40 and 70 to receive, possess and use at any time any byproduct, source and special nuclear material as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required;

(5) EOI, pursuant to the Act and 10 CFR Parts 30, 40 and 70 to receive, possess, and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components; and

(6) EOI, pursuant to the Act and 10 CFR Parts 30 and 70 to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility.

C. This renewed license shall be deemed to contain and is subject to conditions specified in the following Commission regulations in 10 CFR Chapter I; Part 20, Section 30.34 of Part 30, Section 40.41 of Part 40, Sections 50.54 and 50.59 of Part 50, and Section 70.32 of Part 70; and is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

EOI is authorized to operate the facility at steady state reactor core power levels not in excess of 3026 megawatts thermal. Prior to attaining this power level EOI shall comply with the conditions in Paragraph 2.C.(3).

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 325, are hereby incorporated in the renewed license. The licensee shall operate the facility in accordance with the Technical Specifications.

Exemptive 2nd paragraph of 2.C.2 deleted per Amendment 20, 3/3/81.

(3) Additional Conditions

The matters specified in the following conditions shall be completed to the satisfaction of the Commission within the stated time periods following issuance of the renewed license or within the operational restrictions indicated. The removal of these conditions shall be made by an amendment to the renewed license supported by a favorable evaluation by the Commission.

2.C.(3)(a) Deleted per Amendment 24, 6/19/81.

TABLE 3.3-3 (Continued)

ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
7. LOSS OF POWER					
a. 4.16 kv Emergency Bus Undervoltage (Loss of Voltage)	2/Bus	1/Bus	2/Bus	1,2,3	9
b. 460 volt Emergency Bus Undervoltage (Degraded Voltage)	2/Bus	2/Bus	2/Bus	1,2,3	9
8. EMERGENCY FEEDWATER (EFAS)					
a. Manual (Trip Switches)	2 sets of 2 per S/G	2 sets of 2 per S/G	2 sets of 2 per S/G	1,2,3	9
b. SG Level and Pressure (A/B) – Low and ΔP (A/B) – High	4/SG	2/SG	3/SG	1,2,3	10,11
c. SG Level (A/B) – Low and No S/G Pressure – Low Trip (A/B)	4/SG	2/SG	3/SG	1,2,3	10,11
d. ESFAS Logic					
1. Matrix Logic	6	1	3	1,2,3	12
2. Initiation Logic	4	2	4	1,2,3	9
e. Automatic Actuation Logic	2	1	2	1,2,3	13

TABLE 3.3-4 (Continued)

ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION TRIP VALUES

FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUES
4. MAIN STEAM AND FEEDWATER ISOLATION (MSIS)		
a. Manual (Trip Buttons)	Not Applicable	Not Applicable
b. Steam Generator Pressure – Low	≥ 751 psia (2)	≥ 738.6 psia (2)
5. CONTAINMENT COOLING (CCAS)		
a. Manual (Trip Buttons)	Not Applicable	Not Applicable
b. Containment Pressure – High	≤ 18.3 psia	≤ 18.490 psia
c. Pressurizer Pressure – Low	≥ 1650 psia	≥ 1618.9 psia
6. RECIRCULATION (RAS)		
a. Manual (Trip Buttons)	Not Applicable	Not Applicable
b. Refueling Water Tank – Low	6.0 ± 0.5% indicated level	between 5.111% and 6.889% indicated level
7. LOSS OF POWER		
a. 4.16 kv Emergency Bus Undervoltage	(4)	3300.5 ± 49 volts with a 2.3 ± 0.3 second time delay
b. 460 volt Emergency Bus Undervoltage	(4)	429.6 ± 6.4 volts with an 8.0 ± 1.0 second time delay

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 325 TO

RENEWED FACILITY OPERATING LICENSE NO. NPF-6

ENTERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNIT 2

DOCKET NO. 50-368

1.0 INTRODUCTION

By application dated August 25, 2020 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20238C004), Entergy Operations, Inc. (Entergy, the licensee) requested changes to the Technical Specifications (TSs) for Arkansas Nuclear One, Unit 2 (ANO-2).

The proposed changes would revise the current 4.16 kilovolt (kV) emergency bus undervoltage allowable values (AVs) contained in ANO-2 TS 3.3.2.1, "Engineered Safety Feature Actuation System Instrumentation," specifically, within Table 3.3-4, "Engineered Safety Feature Actuation System Instrumentation Trip Values." The license amendment request (LAR) was submitted, in part, to address information contained in U.S. Nuclear Regulatory Commission (NRC, the Commission) Regulatory Issue Summary (RIS) 2011-12, "Adequacy of Station Electric Distribution System Voltages," Revision 1, dated December 29, 2011 (ADAMS Accession No. ML113050583). The proposed amendment would also correct an error in the number of degraded voltage (DV) channels for the 460 volt (V) Emergency Bus Undervoltage Functional Unit 7.b in Table 3.3-3, "Engineered Safety Feature Actuation System Instrumentation," of ANO-2 TS 3.3.2.1.

2.0 REGULATORY EVALUATION

2.1 System Description - Loss of Power Instrumentation

Two levels of undervoltage protection (i.e., loss of voltage (LOV) and DV) are provided for the ANO-2 onsite power system. There are two redundant and independent 4160 V safety buses (2A3 and 2A4), and each safety bus has LOV protection. The LOV protection is provided by two inverse time undervoltage relays on each of the 4160 V safety buses that isolate the safety buses upon detection of LOV, initiate load shedding, and start the associated emergency diesel generator (EDG). The two 4160 V LOV relays per safety bus are connected in parallel such that a single relay failure will not prevent isolation of the associated bus from its offsite power source.

The 4160 V emergency buses provide electrical power to safety-related equipment such as pump motors, motor operated valves (MOVs), and associated control components. The EDGs provide a source of emergency power when offsite power is either unavailable or is insufficiently stable to allow operation of safety-related loads. In the LAR, the licensee stated that undervoltage protection devices generate a signal to the EDGs in the event an LOV or a DV condition occurs on select ANO-2 switchgear or load centers.

Currently, there are two undervoltage relays with inverse voltage time characteristics for each 4160 V Class 1E bus switchgear for the purpose of detecting a loss of bus voltage. The LOV relay AVs are based on a maximum setting, which is below the lowest allowed motor terminal momentary voltage of 3000 V (75 percent of a motor voltage rating of 4000 V). The AVs are adjusted to include channel uncertainties and calibration tolerances within plant procedures such that actual in-plant relay settings are conservative to the AVs. Upon loss of power to either of these relays, after a maximum of 2.6 seconds, load shedding and starting of the associated EDG is initiated. Isolation of the safety-related buses is delayed approximately 2.50 seconds to allow an automatic transfer to offsite power. The safety-related bus is isolated only if the transfer is unsuccessful.

In addition to the above, the two proposed definite time DV undervoltage relays are provided on each safety-related 480 V load center bus with a coincident trip logic (2 out of 2) for the purpose of detecting a sustained undervoltage condition. The undervoltage DV relay (DVR) AVs on the 480 V bus are based on long-term, motor voltage requirements plus the maximum feeder voltage drop allowance resulting in a nominal setting of 92 percent of the motor rated voltage of 460 V. The AVs are adjusted to include channel uncertainties and calibration tolerances within plant procedures such that actual in-plant relay settings are conservative to the AVs. Upon voltage degradation to 92 percent of 460 V and after a delay of approximately 8 seconds, both DVRs must operate to isolate the associated safety-related 4160 V bus from offsite power, and start and connect the associated EDG. The DVRs are delayed approximately 8.0 seconds to prevent spurious operation of the relays when large motors start on the safety-related 4160 V and 480 V buses. The grid undervoltage protection system is further described in Section 8.3.1, “AC [Alternating Current] Power Systems,” of the ANO-2 Safety Analysis Report (SAR) Amendment 29 (redacted) (ADAMS Accession No. ML20294A315).

2.2 Regulatory Requirements

ANO-2 was designed and constructed to meet the intent of the Atomic Energy Commission’s (AEC’s) General Design Criteria (GDC) for Nuclear Power Plant Construction Permits, as originally proposed in July 1967. ANO-2 SAR Sections 3.1.1 through 3.1.6 provide a comparison with the AEC GDC published as Appendix A to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50 in 1971. Each criterion is followed by a summary discussion of the design and procedures, which are intended to meet the design objectives reflected in the criterion.

ANO-2 SAR Section 3.1.1 describes the ANO design’s conformance with GDC 13, “Instrumentation and control,” of Appendix A to 10 CFR Part 50 requirements. Detailed instrumentation and control design information is provided in Section 7 of the ANO-2 SAR.

GDC 13, “Instrumentation and control,” of Appendix A to 10 CFR Part 50, states, that:

> Instrumentation shall be provided to monitor variables and systems over their anticipated ranges for normal operation, for anticipated operational occurrences, and for accident conditions as appropriate to assure adequate safety, including those variables and systems that can affect the fission process, the integrity of the reactor core, the reactor coolant pressure boundary, and the containment and its associated systems. Appropriate controls shall be provided to maintain these variables and systems within prescribed operating ranges.

ANO-2 SAR Sections 3.1.1 and 8.3.1.2 describe the ANO-2 design’s conformance with GDC 17, “Electric power systems,” of Appendix A to 10 CFR Part 50 requirements.

GDC 17, “Electric power systems,” of Appendix A to 10 CFR Part 50, states, in part, that:

> An onsite electric power system and an offsite electric power system shall be provided to permit functioning of structures, systems, and components important to safety. The safety function for each system (assuming the other system is not functioning) shall be to provide sufficient capacity and capability to assure that (1) specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences and (2) the core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents.

The regulations in 10 CFR 50.36, “Technical specifications,” require, in part, that TSs shall be included by applicants for a license authorizing operation of a production or utilization facility. The regulation in 10 CFR 50.36(c) requires that TSs include items in five specific categories related to station operation. These categories are (1) safety limits, limiting safety system settings, and limiting control settings, (2) limiting conditions for operation, (3) surveillance requirements (SRs), (4) design features, and (5) administrative controls. The regulation does not specify the particular requirements to be included in a plant’s TSs.

The regulation in 10 CFR 50.36(c)(1)(ii)(A) states, in part, that:

> Limiting safety system settings for nuclear reactors are settings for automatic protective devices related to those variables having significant safety functions. Where a limiting safety system setting is specified for a variable on which a safety limit has been placed, the setting must be so chosen that automatic protective action will correct the abnormal situation before a safety limit is exceeded. If, during operation, it is determined that the automatic safety system does not function as required, the licensee shall take appropriate action, which may include shutting down the reactor.

The regulation in 10 CFR 50.36(c)(3), “Surveillance requirements,” states that SRs “are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met.”

The regulation in 10 CFR 50.55a(h), "Protection and safety systems," requires, in part, that protection systems for plants with construction permits issued after January 1, 1971, but before May 13, 1999, must meet the requirements stated in either Institute of Electrical and Electronics Engineers (IEEE) Std. 279-1968, "Proposed IEEE Criteria for Nuclear Power Plant Protection Systems"; IEEE Std. 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations"; or IEEE Std. 603-1991, "Criteria for Safety Systems for Nuclear Power Generating Stations," and the correction sheet dated January 30, 1995. For nuclear power plants with construction permits issued before January 1, 1971, protection systems must be consistent with their licensing basis or may meet the requirements of IEEE Std 603-1991 and the correction sheet dated January 30, 1995. The ANO-2 construction permit was issued on December 6, 1972.

A brief description of conformance of the undervoltage protection and load shedding features is provided in ANO-2 SAR Sections 8.3.1.1.8.8, "Automatic Tripping and Loading of Buses"; 8.3.1.4, "Independence of Redundant Systems"; 8.3.1.6, "Grid Undervoltage Protection (Millstone 2 and ANO Events)"; and 8.3.1.6.2, "Description of Changes."

2.3 Regulatory Guidance

Regulatory Guide (RG) 1.105, Revision 3, "Setpoints for Safety-Related Instrumentation," dated December 1999 (ADAMS Accession No. ML993560062), describes a method acceptable to the NRC staff for complying with the NRC's regulations for ensuring that setpoints for safety-related instrumentation are initially within and remain within the TS limits. RG 1.105 endorses Part I of Instrument Society of America[1] (ISA) Standard 67.04-1994 (ISA-S67.04-1994), "Setpoints for Nuclear Safety-Related Instrumentation." The NRC staff used RG 1.105, Revision 3, to establish the adequacy of the licensee's setpoint calculation methodologies and the related plant surveillance procedures.

NRC RIS 2006-17, "NRC Staff Position on the Requirements of 10 CFR 50.36, 'Technical Specifications,' Regarding Limiting Safety System Settings During Periodic Testing and Calibration of Instrument Channels," dated August 24, 2006 (ADAMS Accession No. ML051810077), discusses issues that could occur during testing of limiting safety system settings and which, therefore, may have an adverse effect on equipment operability. The RIS also represents an approach that is acceptable to the NRC staff for addressing these issues in licensing actions.

RIS 2011-12, Revision 1, clarifies voltage studies necessary for DVR (second level undervoltage protection) setting bases and transmission network/offsite/station electric power system design bases for meeting the regulatory requirements specified in GDC 17 of Appendix A to 10 CFR Part 50. RIS 2011-12, Revision 1, states, in part, that "Licensee voltage calculations should provide the basis for their DVR settings, ensuring safety-related equipment is supplied with adequate voltage (dependent on equipment manufacturers design requirements), based on bounding conditions for the most limiting safety-related load (in terms of voltage) in the plant."

[1] In 2008, the name of this organization was changed to International Society of Automation.

2.4 Proposed Changes

The proposed amendment would modify ANO-2 TS 3.3.2.1, Functional Unit 7.a, "4.16 kv Emergency Bus Undervoltage," AVs as follows:

Existing Table 3.3-4 states:

2300 ± 699 volts with a 0.64 ± 0.34 second time delay.

Proposed Table 3.3-4 states:

3300.5 ± 49 volts with a 2.3 ± 0.3 second time delay.

The licensee also proposed to correct a non-conservatism in the ANO-2 TSs. Specifically, the proposed amendment would also change the total number of channels, the number of channels to trip, and the minimum number of channels operable associated with the DVRs in TS 3.3.2.1, Table 3.3-3, Functional Unit 7.b. The TSs would be revised to indicate that both relays on a given bus are required to initiate transfer of power to the respective EDG source and, therefore, both channels (relays) are required to be operable on each bus, as shown below (the proposed additions are shown underlined and the proposed deletions are shown in strikeout):

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
7. LOSS OF POWER					
a. 4.16 kv Emergency Bus Undervoltage (Loss of Voltage)	2/Bus	1/Bus	2/Bus	1,2,3	9
b. 460 volt Emergency Bus Undervoltage (Degraded Voltage)	2~~1~~/Bus	2~~1~~/Bus	2~~1~~/Bus	1,2,3	9

In Section 3.0, "Technical Evaluation," of the enclosure to the LAR, the licensee provided a summary calculation for the new LOV relay trip setpoint and associated time delay. This summary setpoint calculation shows that the LOV setpoint is based on the current TS AV of 3000 V and that the proposed values also include the anticipated voltage drop plus margin and allowances for channel uncertainty. The licensee also stated, in part, that the minimum allowable time delay of 2 seconds is sufficient to withstand transfer to an alternate offsite source without tripping, and that the maximum allowable time delay of 2.6 seconds ensures protection of safety-related equipment.

The licensee did not propose to change the existing DVR TS voltage and time delay AVs.

In the LAR, the licensee described the addition of motor start protection (MSP) relays, which are additional DVRs wired in parallel with the existing DVRs. In the LAR enclosure, the licensee stated, in part, that "The MSP relays will be set at a slightly lower voltage than the DV relays and will ensure that 480 V motor voltage is maintained above the 80% minimum equipment acceptable start voltage. No change is proposed for the existing DV relays or associated TS allowable voltage and time delay values." The licensee further stated in the LAR, that "Because the current ANO-2 design and licensing basis does not assume a sustained

undervoltage condition [i.e., at a voltage below the current DV setpoint in the TSs], Entergy does not intend to include the new additional MSP relays within the TSs. However, the MSP relays will be controlled and tested consistent with requirements for Class 1E devices."

3.0 TECHNICAL EVALUATION

3.1 Evaluation of Proposed LOV Relay Change

3.1.1 LOV Relay Voltage Settings

The current LOV protection consists of two inverse-time undervoltage relays on each of the 4160 V safety buses that act to detect LOV, isolate the safety buses, initiate load shedding, and start the associated onsite power source within approximately 1 second. The existing relay's maximum setting is based on the lowest allowed motor terminal momentary voltage of 75 percent of the motor voltage rating of 4000 V.

The licensee reevaluated the undervoltage protection scheme at ANO-2 and is implementing modifications to protect important in-plant equipment from damage during undervoltage conditions. As part of the modifications, the licensee is replacing the existing inverse time LOV relays with new ABB model 27N definite time relays. The licensee has requested a change to the TS LOV relay voltage and time delay settings. The proposed actuation range of the new LOV relays is 3251.5 V to 3349.5 V with a time delay of greater than or equal to (≥) 2.0 seconds and less than or equal to (≤) 2.6 seconds. The proposed actuation voltage range is based on maintaining the current protection of not going below a momentary motor voltage of 3000 V. The 2.6-second maximum relay operation time coupled with the proposed 2.5-second time delay (± 10 percent) following LOV relay time-out before the 480 V load center bus is de-energized (for a total of 5.35 seconds) has the potential for imposing undervoltage conditions on safety-related equipment for a longer duration. The licensee has evaluated the impact of low voltage conditions, and the proposed time delay associated with separating the safety loads when the LOV relays detect undervoltage conditions.

In the enclosure to the LAR, the licensee stated, in part, that:

> Given the new LOV relay allowable voltage and time delay values proposed above, the revised analysis shows that the protective relays for 4160 V motor loads will not trip if the motor is drawing locked-rotor current for a time period equal to the maximum LOV relay time delay plus the acceleration time of the motor on the onsite source [as discussed previously, the MSP or DV relays prevent loss of 480 V motors and MOVs]. The LOV relay setting also ensures that 4160 V and 480 V motors will not stall if already running.

The licensee further stated in the LAR, that, "This additional delay time and exposure to degraded voltage conditions does not result in the loss of any required plant equipment."

Based on the information provided by the licensee, the NRC staff finds the revised changes to the LOV relay setpoints, and the change in delay time for separating the safety buses from a degraded power source, to be reasonable because the changes will continue to permit functioning of structures, systems, and components important to safety in compliance with GDC 17.

3.1.2 Sustained DVs and MSP Relays

The licensee stated in the LAR that no changes were being made to the existing DVR setpoints. The licensee also provided information regarding new MSP relays that provide additional protection against sustained DV conditions. ANO-2's DVR licensing basis is documented in its SAR and TSs. The DVR function is separate from the LOV function and is outside of the scope of this LAR. Therefore, the NRC staff made no determinations regarding DVRs, MSPs, or the potential for sustained DV conditions in this safety evaluation (SE).

3.1.3 Summary of NRC Staff's Evaluation of Proposed LOV Relay Change

The NRC staff evaluated the LAR in accordance with the current licensing basis of ANO-2 with respect to LOV conditions and concluded that the proposed changes to the LOV relays and corresponding TSs provide reasonable assurance that equipment required to mitigate the consequences of an accident will be protected and available when offsite sources degrade to an unacceptable level. The NRC staff determined that the proposed LOV relay change at ANO-2 will maintain the licensee's current compliance related to GDC 17 and 10 CFR 50.55a(h) requirements.

3.2 Evaluation of Proposed TS Settings

The NRC staff reviewed the licensee's regulatory and technical analyses in support of the proposed changes, as described in the LAR, and its attachments. The NRC staff evaluated the proposed amendment using the guidance in RG 1.105, Revision 3, and Part I of ISA-S67.04-1994 to verify (a) whether the proposed setpoints for DV, LOV, and time delay of safety-related instrumentation are established within the TS limits; and (b) the safety-related equipment is supplied with adequate voltage based on bounding conditions for the most limiting safety-related load of the plant.

As part of its evaluation, the NRC staff performed an independent confirmatory evaluation to:

- Verify the licensee's setpoint calculation methodology, using the square root of the sum of the squares (SRSS), to assure that control and monitoring setpoints are established and maintained in a manner consistent with plant safety function requirements.

- Verify the licensee's setpoint calculation values are adequate to assure, with a high confidence level, that required protective actions are initiated before the associated plant process parameters exceed their analytical limits.

3.2.1 Summary of Licensee Methodology

The licensee's proposed change is based on the analysis utilizing the guidance in RIS 2011-12 to modify the ANO-2 undervoltage schemes.

The NRC staff reviewed the summary of the calculations provided in the LAR. The NRC staff confirmed the following with respect to the licensee's setpoint calculation methodology:

- The setting tolerance to establish an acceptable as-found setpoint range was calculated using the SRSS.

- The relay drift is calculated based on the performance of a statistical analysis of the as-left and as-found data (32 data points over a 6-year period). The total loop error was calculated using the SRSS plus algebraic approaches.

The NRC staff concludes that the licensee's methods for combining uncertainties for the proposed AV and associated time delay values of Functional Unit 7.a in TS Table 3.3-4 are consistent with the guidance in Section 4.4 "Combination of Uncertainties," from Part I of ISA-S67.04-1994, and Regulatory Position C.1. from RG 1.105, Revision 3. Additionally, a figure on page 14 of the enclosure to the LAR shows the relationship among the allowance for relay drift and margin, the channel uncertainty, and the desired setting. This figure and the relationship stated above align with those shown in Figure 1, "Nuclear Safety-Related Setpoint Relationships," from RG 1.105, Revision 3. The NRC staff found that the SRSS methodology used to calculate the proposed AV is consistent with the methodology in Part I of ISA-S67.04-1994 and the guidance in RG 1.105, Revision 3, and therefore, would provide reasonable assurance that the proposed setpoints are established and maintained in a manner consistent with plant safety function requirements.

3.2.2 NRC Evaluation of AVs for LOV Relay Voltage Setting and Associated Time Delay Setting

For the purpose of this SE, the following terms are used:

- Analytical Limit (AL) – Limit of a measure or calculated variable established by the safety analysis to ensure that a safety limit is not exceeded.

- Allowable Value (AV) – A limiting value that the trip setpoint may have when tested periodically, beyond which appropriate action shall be taken.

- Trip Setpoint – A predetermined value for actuation of the final setpoint device to initiate a protective action.

Additionally, Section 4.3.1 and Figure 1 of ISA-S67.04-1994 identify allowances for offsetting the trip setpoint from the AL, and for ensuring that the channel remains below the AV during periodic surveillances. For this SE, the following terms are used by the NRC staff to support its evaluation:

- Trip Margin – an allowance provided between the trip setpoint and the AL to ensure a trip before the AL is reached.

- Nominal Trip Setpoint (NTS) Margin ($Margin_{NTS}$) - An allowance provided between the NTS and the AL (Region A in Figure 1 of ISA-S67.04-1994). The NRC staff noted that in the LAR, the licensee used the term "Desired Relay Dropout Voltage" for NTS.

- AV Margin ($Margin_{AV}$) - The margin between the Maximum AV and the AL that is observable during TS surveillances where the channel may be determined inoperable (Region C in Figure 1 of ISA-S67.04-1994).

The NRC staff reviewed the proposed AVs for the LOV relay settings associated with Functional Unit 7.a and performed an independent verification to confirm whether there are adequate allowances for instrument channel performance uncertainty between the ALs and NTSs and

associated AVs of LOV and relay time delay (for Functional Unit 7.a in TS Table 3.3-4) to satisfy the requirements of 10 CFR 50.36(c)(1)(ii)(A). The NRC staff's evaluation is discussed in more detail below.

In addition, the NRC staff evaluated the proposed changes with respect to conformance with RIS 2011-12 and RIS 2006-17, regarding whether the licensee properly used the staff's guidance in establishing AVs, nominal setpoints, and as-left and as-found tolerances to be applied to the Functional Unit 7.a in TS Table 3.3-4.

3.2.2.1 Evaluation of AV for LOV Relay Voltage Setting

In the LAR, the licensee proposed to change the AV for the LOV relay voltage setting associated with Functional Unit 7.a in TS Table 3.3-4, as shown below:

AV of Loss of Voltage Relay Setting	
Existing	Proposed
2300 ± 699 volts	**3300.5 ± 49 volts**

In the enclosure to the LAR, the licensee stated that "The safety related 4160 V switchgear 2A3 and 2A4 LOV relays are the same model of 27N relays used on the safety-related 480 V load centers 2B5 and 2B6. Therefore, the relay uncertainty and drift values calculated in CALC-94-E-0001-01 (Reference 12 [of the LAR]) for the 2B5 and 2B6 relays are used to determine the 2A3 and 2A4 LOV relay dropout and pickup settings."

The licensee also stated in the LAR that "The relay drift is calculated based on the performance of a statistical analysis of the as-left and as-found data (32 data points over a 6-year period). Based on this statistical analysis, the relay dropout voltage drift is documented as 0.816%."

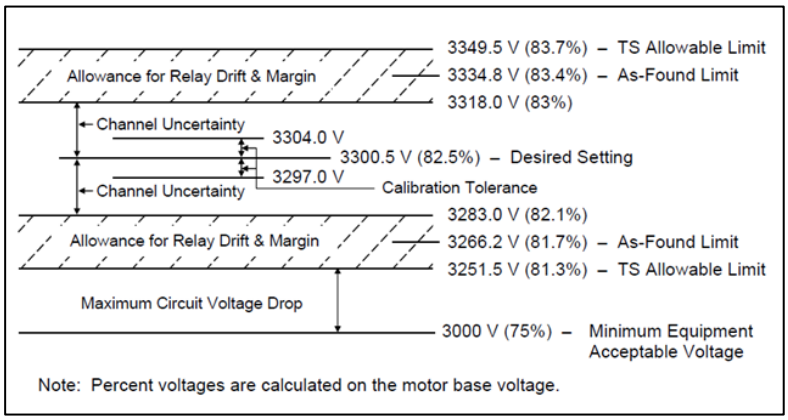
The NRC staff reviewed the summary of the ANO-2 LOV relay setpoint uncertainty calculation provided in the LAR that supports the proposed AV for the LOV relay voltage setting associated with Functional Unit 7.a in TS Table 3.3-4. The summary includes the relay setting design basis, such as the Desired Relay Dropout Voltage (V_{DRD}) (or NTS) to be applied to Functional Unit 7.a, the channel uncertainty or total loop uncertainties associated with these settings, and the expected relay drift (including the 0.3 class potential transformer (PT)).

The licensee also provided the ABB Single Phase Voltage Relays, Type 27N, catalog number (Model 411T5175-HF-L). The NRC staff reviewed the vendor instruction manual of this model to verify that the applicable pickup and dropout voltage adjustment allows for the difference between pickup and dropout to be set as low as 0.5 percent, and that the performance tolerances (the temperature effect (TE) in the repeatability over temperature range is 0.4 percent without harmonic filter) in the ANO-2 LOV relay setpoint uncertainty calculation are consistent with the data in this vendor instruction manual.

The NRC staff reviewed the LOV relay calculation in Section 3.0 of the LAR to examine the specific variables, total channel uncertainty, and as-found tolerance (AFT) for the V_{DRD} equations and finds that they are adequate. The NRC staff also finds that the calculation to determine the AFT, and its methodology are consistent with the guidance in RIS 2006-17.

In the LAR, the licensee provided a figure, as illustrated in Figure 1 below, as a high-level summary of the various calibration components.

Figure 1: Licensee's Summary of the Calibration of the LOV Relay



Using the licensee's equations and information in Figure 1 above, the NRC staff summarized the following results of the licensee's calculations in Table 1 below:

Table 1: Licensee LOV Setting Calculation Results[2]

Channel Uncertainty (CU) = 0.56% of NTS
V_{DRD} = 94.2 V + 0.1 V (added margin) = 94.3 V or 82.5% of Motor Rated Voltage (3300.5 V)
Nominal pickup voltage and 0.5% band = 94.8 V or 83.0% of Motor Rated Voltage (3318.0 V))
As-Left Upper Limit = 94.3 V + 0.1 V (calibration tolerance) = 94.4 V (3304.0 V)
As-Left Lower Limit = 94.3 V – 0.1 V (calibration tolerance) = 94.2 V (3297.0 V)
As-Found Tolerance = 0.010396 = 1.0396% of NTS
Dropout Maximum As-Found Limit = 95.28 V (3334.8 V)
Dropout Minimum As-Found Limit = 93.32 V (3266.2 V)
Dropout Upper Setting Adjusted for CU = 94.8 V (3318.0 V)
Dropout Lower Setting Adjusted for CU = 93.8 V (3283.0 V)
Maximum TS Allowable = 95.7 V (3349.5 V)
Minimum TS Allowable = 92.9 V (3251.5 V)

Based on the information in Table 1 and Figure 1 above, the NRC staff used the guidance in RG 1.105, Revision 3, to independently confirm whether there are adequate margins for instrument channel performance uncertainty between the AL and V_{DRD} or NTS ($Margin_{NTS}$) and associated AV ($Margin_{AV}$) (for Functional Unit 7.a in ANO-2 TS Table 3.3-4 of Section 3.3.2.1) to satisfy the requirements of 10 CFR 50.36(c)(1)(ii)(A). It should be noted that the NRC staff performed an evaluation of the $Margin_{NTS}$ and $Margin_{AV}$ of the lower level only because the

[2] The calculation results are the PT secondary voltages. The primary voltages are in the parentheses (secondary voltages x PT ratio (35)).

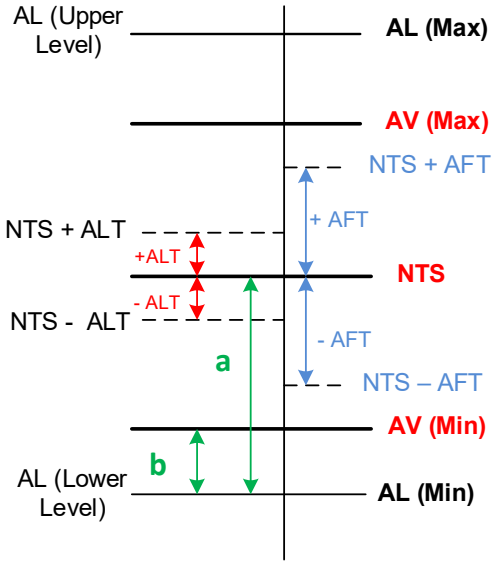
affected LOV relays detect the loss of the 4.16 kV Class 1E bus in the event an LOV condition occurs.

$Margin_{NTS}$ (a) = I AL – NTS I (absolute value)
$Margin_{AV}$ (b) = I AL - AV I (absolute value)
Margin Ratio % = (b/a) x 100 %

In this confirmatory evaluation, the NRC staff considered the minimum equipment acceptable voltage (3000 V) as the AL of the lower level. The NRC staff's evaluation and confirmatory results are summarized in Figure 2 below:

Figure 2: LOV Relay AVs and NTS (or V_{DRD}) Relationships and Margins Calculated by the NRC Staff

ANO-2 LOV Relay Allowable Values (AVs) & Nominal Trip Setpoint (NTS) Relationships



Note: Diagram Not To Scale
* V_{DRD}: Desired Relay Dropout Voltage

$Margin_{AV}$ & $Margin_{NTS}$ Calculation

	Function Unit 7.a in TS Table 3.3-4	Setting (V)	
		Primary Voltage	Secondary voltage
1	AV (Max)	3349.5	95.70
2	As-Found Tolerance (AFT)	±1.0396 % of NTS	
3	As-Left Tolerance (ALT)		± 0.1V
4	NTS + AFT	3334.8	95.28
5	NTS + ALT	3304.0	94.40
6	NTS (*V_{DRD})	3300.5	94.30
7	NTS - ALT	3297.0	94.20
8	NTS - AFT	3266.2	93.32
9	AV (Min)	3251.5	92.90
10	AL (Min)	3000.0	85.71
11	$Margin_{AV}$ (b)	251.5	7.19
12	$Margin_{NST}$ (a)	300.5	8.59
		%	%
13	Margin Ratio ((b/a)*100)	83.7	83.7

Based on the information in Table 1 and Figures 1 and 2 above, the NRC staff has determined the following with respect to the proposed AV for the LOV Relay in ANO-2 TS 3.3.2.1, specifically Functional Unit 7.a in TS Table 3.3-4:

- The NTS, inclusive of their AFTs, are less than the maximum AV and greater than the minimum AV, and therefore, would assure that the trip signals will be initiated before the NTS reached the AV values.

- The margin ratio percentage between the NTS and AV margins is greater than 83 percent and is adequate. These margins ensure that the trip setpoints have been chosen to assure that a trip or safety actuation will occur significantly before the measured process reaches the lower ALs (minimum equipment acceptable voltage). The proposed AV setting supports an automatic protective action that will correct the abnormal situation before a safety limit is exceeded.

- The proposed maximum and minimum TS AVs of the LOV relay are higher than the minimum allowable motor terminal momentary voltage of 75 percent of the motor voltage rating of 4000 V to ensure that 4160 V and 480 V motors will not stall if already running, and to maintain these variables and systems within prescribed operating ranges.

Based on the above discussion, the NRC staff finds that the proposed LOV relay settings (maximum and minimum AVs) for Functional Unit 7.a in Table 3.3-4 of TS Section 3.3.2.1 are consistent with RG 1.105, Revision 3, satisfy the requirements of 10 CFR 50.36(c)(1)(ii)(A), and continue to meet GDC 13. Therefore, the proposed AVs (3300.5 ± 49 V) are acceptable.

3.2.2.2 Evaluation of AV of LOV Relay Time Delay Setting

The licensee proposed to change the LOV time delay setting Functional Unit 7.a in Table 3.3-4 of TS 3.3.2.1, as indicated below:

AV for LOV Relay Time Delay Setting	
Existing	Proposed
0.64 ± 0.34 seconds	**2.3 ± 0.3 seconds**

The licensee also provided specific results from the calculations for the proposed AV of the LOV time delay setting values in the table above.

In the enclosure to the LAR, the licensee stated, in part (emphasis added):

> Because the 2A3 and 2A4 switchgear LOV relays are the same model of 27N relays used on the 2B5 and 2B6 load centers, the relay timer uncertainty and drift values calculated in CALC-94-E-0001-01 for the 2B5 and 2B6 relays were used to validate the 2A3 and 2A4 LOV relay time delay setting of 2.3 seconds. **A time delay of 2.3 seconds is established based on motor stall times for the affected buses**, given the maximum voltage drop experienced by these buses when starting large motors. CALC-19-E-0001-01 verifies the acceptability of this setpoint selection.
>
> The relay timer drift is calculated based on the performance of a statistical analysis of the as-left and as-found data (32 data points over a 6-year period). The relay timer drift is documented as 0.45% [of time delay setting].

Similar to the LOV relay voltage setting, the licensee's summary of the LOV time delay calculation includes the relay setting design basis, such as the Designed Relay Time Delay (T_D) to be used during calibration surveillances, the expected relay drift between surveillances, the uncertainties associated with these settings, the measurement and test equipment uncertainties, and the AFT and AFT acceptance values to be applied during technical specification surveillances.

The NRC staff reviewed the summary of the ANO-2 setpoint uncertainty calculation for the LOV time delay and the vendor instruction manual of the ABB Single Phase Voltage Relays Type 27N (Model 411T5175-HF-L) to verify that:

- The TE performance tolerance (1 percent) with respect to the pickup and dropout settings repeatability over the temperature ranges (0 degrees Celsius (ºC) to 55 ºC

and 10 ºC to 40 ºC) is greater than the temperature range uncertainty (i.e., greater than 0.4 percent without harmonic filter and greater than 0.75 percent with harmonic filter). However, in the LAR the licensee stated that "When the effect of voltage variation and temperature variation on the relays is not available from the manufacturer, the total effect is assumed to be 1%." In the licensee's calculation of CU, TUB, TLB, and ±AFT on pages 15 and 16 of the enclosure to the LAR, the licensee used this assumed TE (1 percent). The NRC staff used this ±AFT to confirm that the margins for instrument channel performance uncertainty, between (i) the maximum (max) AL and the proposed max AV, and (ii) the max AL and T_D (NTS), are adequate. Therefore, the assumed TE (1 percent) is acceptable.

- The Module Reference Accuracy (10 percent) is consistent with the vendor instruction manual data.

The NRC staff reviewed the LOV time delay calculation in Section 3.0 of the LAR to examine the specific variables, total channel uncertainty, and AFT for the time delay setting (T_D) equations and finds that they are adequate. The NRC staff also finds that the calculation to determine the AFT and its methodology are consistent with the guidance in RIS 2006-17.

Using the licensee's equations, the NRC staff summarized the following results of the licensee's calculations, in Table 2 below:

Table 2: LOV Time Delay Setting Results of Licensee's Calculation

CU = 10.2 percent of time delay setting (T_D)
T_{UB} = 2.55 seconds (using 2.6 seconds for margin) ($T_{UB:}$ Time delay upper band)
T_{LB} = 2.06 seconds (using 2.0 seconds for margin) ($T_{LB:}$ Time delay lower band)
As-Left (Calibration) Upper Limit = 2.4 seconds
As-Left (Calibration) Lower Limit = 2.2 seconds
As-Found Tolerance = 0.10648 = 10.648 percent of time delay setting (T_D)
Maximum As-Found Limit = 2.54 seconds
Minimum As-Found Limit = 2.06 seconds

In the enclosure to the LAR, the licensee stated, in part: "Per the ABB vendor manual for Type 27N undervoltage relays, the Model 411T5xxx has a time delay setting range of 2 to 20 seconds."

With the information in Table 2 above, the NRC staff used the guidance in RG 1.105, Revision 3, to independently confirm whether there are adequate margins for instrument channel performance uncertainty between the AL and T_D (NTS) and the associated AV of Functional Unit 7.a (in Table 3.3-4, Section 3.3.2.1 of the ANO-2 TSs) to satisfy the requirements of 10 CFR 50.36(c)(1)(ii)(A).

The NRC staff performed an independent confirmatory evaluation of the margins between the AL and the T_D ($Margin_{TD}$), and between the AL and the AV ($Margin_{AV}$). It should be noted that the NRC staff performed an independent confirmatory evaluation of the $Margin_{TD}$ and $Margin_{AV}$ of the upper level of the time delay only. As shown in Figure 3 below, the ANO-2 Time Delay Settings have two levels -- the upper level and lower level. However, because the function of

the LOV relay is to detect the loss of the 4.16 kV Class 1E bus in the event an LOV condition occurs, only the upper level time delay setting of the LOV relay is applicable in the evaluation.

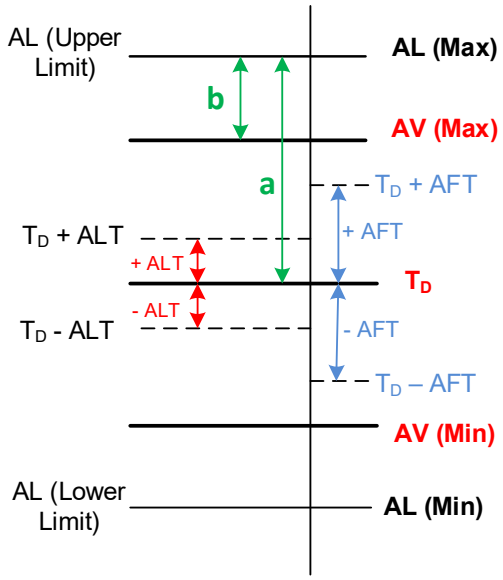
$Margin_{TD}$ (a) = AL - T_D
$Margin_{AV}$ (b) = AL - AV
Margin Ratio % = (b/a) x 100 %
(T_D is the licensee's term used for NTS of design time delay)

On Page 8 of the enclosure to the LAR, the licensee stated "The 480 V MCC [motor control center] motors that use the MSP relay for start protection assumed the maximum 2.6-second LOV relay time delay plus a 2.5-second time delay (±10%) following LOV relay time-out before the 480 V load center bus is de-energized (for a total of 5.35 seconds) with the addition of acceleration time of the motor on the onsite source." Based on this information, in this confirmatory evaluation, the NRC staff used the maximum LOV relay time-out (5.35 seconds) as the AL of the upper level of time delay of the LOV relay.

The NRC staff's evaluation is summarized in Figure 3 below.

Figure 3: LOV Relay Time Delay Settings Relationships and Margins Calculation by the NRC Staff

ANO-2 LOV Relay Time Delay Settings Relationships



Note: Diagram Not To Scale

$Margin_{AV}$ & $Margin_{TD}$ Calculation

Function 7.a in TS Table 3.3-4		Time Delay Setting (Seconds)
1	AL (Upper Limit)	5.35
2	AV (Max)	2.60
3	As-Found Tolerance (AFT)	10.648% of T_D
4	As-Left Tolerance (ALT)	0.10
5	T_D + AFT	2.54
6	T_D + ALT	2.40
7	T_D	**2.30**
8	T_D - ALT	2.20
9	T_D - AFT	2.06
10	AV (Min)	2.00
11	$Margin_{AV}$ (b)	2.75
12	$Margin_{TD}$ (a)	3.05
		%
13	Margin Ratio ((b/a)*100)	90.16

Based on the information in Table 2 and Figure 3 above, the NRC staff has determined the following with respect to the proposed AV for the LOV relay time delay associated with Functional Unit 7.a in Table 3.3-4 of Section 3.3.3.2.1 of ANO-2 TS:

- The T_D, inclusive of the AFTs (± AFTs), (T_D + AFT) is less than the maximum AV, and (T_D - AFT) is greater than the minimum AV, and therefore, would ensure that the trip signals will be initiated before the T_D reaches the AV values.

- The margin ratio percentage between the T_D and AV margin is greater than 90 percent and is adequate. This margin ensures that the trip setpoint has been chosen to assure that a trip or safety actuation will occur significantly before the measured process reaches the Upper ALs. The proposed AV setting supports an automatic protective action that will correct the abnormal situation before a safety limit is exceeded.

- The proposed maximum/minimum TS AV is within the time delay setting range of 2 to 20 seconds of the ABB vendor manual for Type 27N undervoltage relays, Model 411T5175-HF-L, and would maintain the associated variables and systems within prescribed operating ranges.

Based on the above discussion, the NRC staff finds that the proposed AVs of the LOV time delay settings (maximum and minimum AV time delay) for SR 3.3.8.2.b (SR for the channel calibration performance) were developed consistent with the guidance in RG 1.105, satisfy the requirements of 10 CFR 50.36(c)(1)(ii)(A), and continue to meet GDC 13. Therefore, the proposed AVs for the relay time delay settings (≤ 2.6 seconds and ≥ 2.0 seconds) are acceptable.

3.3 Evaluation of Correction of Number of Degraded Voltage Channels for Functional Unit 7.b

In the current ANO-2 TS Table 3.3-3, Functional Unit 7.b, requires only one DV channel (relay) and one DV channel operable per 480 V vital load center. Only one DV channel (relay) is required to “trip” (actuate) for the protective feature to perform its specified safety function.

In the LAR, the licensee proposed to correct the number of the required channels (i.e., (i) Total No. Channels, (ii) Channels to Trip, and (iii) Minimum Channels Operable) of Functional Unit 7.b, associated with the DV relays. The licensee proposed to change the required number of these channels from one per bus (1/Bus) to two per bus (2/Bus).

As described in the LAR and its attachments, the current inverse time undervoltage relays (for the vital 4.16 kV switchgear 2A3 and 2A4) are being replaced with the definite time relays. Both 4.16 kV engineered safety feature (ESF) Buses, 2A3 and 2A4, have been equipped with LOV relays to monitor the condition of the voltage on the buses. If the LOV is sensed by the associated LOV relays, all loads (except the vital 480 ESF 2B5 and 2B6) will be shed to automatically start the EDGs.

In the enclosure of the LAR, the licensee stated, in part:

> Under normal operating conditions (absence of ESF signal) when the voltage at the ESF load centers 2B5/2B6 drops and remains low for the duration of the approximate 8-second DV relay time delay, the associated EDG automatically starts and the incoming breakers from offsite power (via 2A1 and 2A2) to ESF

> buses 2A3 and 2A4 will be tripped, thus isolating the ESF buses from the degraded system. Load s on buses 2A3 and 2A4 will restart in sequence, powered by the respective EDG. Both DV relays on a given ESF load center must actuate for the described sequence of event to be initiated.
>
> . . .
>
> If a DV relay is inoperable, the associated TS Action requires restoration of the relay (or channel) within 48 hours, tied to the existing total number of channels required for operability (one per bus). With the total number of channels correctly shown as requiring two channels per bus, the loss of either DV relay on the associated bus will require entry into the current 48-hour restoration time limit of Table 3.3-3, Action 9.

The figure on page 3 of 22 of the enclosure to the LAR shows that the ANO-2 480 V auxiliary system's load centers are arranged in pairs with one tie breaker between pairs for non-ESF buses, and two tie breakers for ESF Buses 2B5 and 2B6. The relays on a given bus must drop out to begin the sequence of transferring vital loads from offsite power to the respective EDG (with time delay). The licensee also stated that both DV relays on a given bus must drop out to perform similar actions, but only after a time delay (8.0 ±1.0 seconds). This indicates that both relays on a given bus are required to initiate transfer of power to the respective EDG source and, therefore, both channels (relays) are required to be operable on each bus.

The NRC staff reviewed ANO-2 SAR, Section 8.3.1.6.1, to verify that the proposed configuration, in which both of the two DV channels (relays) are required per associated bus and both are required to "trip," is consistent with the aforementioned system design and aligns with the design basis as described in the ANO-2 SAR.

Based on the ANO-2 SAR and the information the licensee provided in the LAR described above, the NRC staff finds that the proposed correction of the number of required channels for the DVRs (of Functional Unit 7.b in the ANO-2 TS Table 3.3-3.) from "1/Bus" to "2/Bus" (1) matches the ANO-2 plant loss of power design; (2) resolves a non-conservatism in the current ANO-2 TS; and (3) provides more protective features to perform the TS safety function by increasing the number of required channels for Functional Unit 7.b. Therefore, this proposed change continues to satisfy the regulatory requirements listed in Section 2.2 of this SE and is acceptable.

3.4 Summary of NRC Staff's Technical Evaluation of the Proposed TS Settings and Proposed Correction to the Number of Degraded Voltage Channels for Functional Unit 7.b

The NRC staff evaluated the proposed TS settings and the proposed correction to the number of degraded voltage channels for Functional Unit 7.b in accordance with the current licensing basis of ANO-2 with respect to LOV conditions, and concluded the following:

As described in Section 3.1 of this SE, the licensee used the SRSS combinatorial method to calculate the proposed settings. The NRC staff finds that this methodology provides a reasonable assurance that control and monitoring setpoints are established and maintained in a manner consistent with plant safety function requirements and consistent with RG 1.105 Revision 3.

Furthermore, as described in Section 3.2 of this SE, the NRC staff performed independent confirmatory evaluations of calculated margins and margin comparisons to confirm that required protective actions will be initiated before the associated plant process parameters exceed their ALs. Additionally, the licensee's proposed "as-left" and "as-found" values associated with the setpoint changes were determined in a manner consistent with RIS 2006-17 in establishing the as-left and as-found tolerances. The NRC staff finds that the AVs for the LOV relay setting of Functional Unit 7.a in TS Table 3.3-4 provide sufficient margins to satisfy the requirements of 10 CFR 50.36(c)(1)(ii)(A) and continue to meet 10 CFR Part 50, Appendix A, GDC 13. Therefore, the NRC staff finds that the proposed AVs are acceptable.

In Section 3.3 of this SE, the NRC staff found that the proposed change to correct the required number of the DV channels for the 4.16 kV Emergency Bus Undervoltage in TS Table 3.3-3, Functional Unit 7.b, aligns with the ANO-2 plant design and resolves a non-conservatism in the current ANO-2 TSs. Therefore, the proposed change to TS Table 3.3-3 is acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Arkansas State official was notified of the proposed issuance of the amendment on July 16, 2021. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes requirements with respect to installation or use of facility components located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration published in the *Federal Register* on December 1, 2020 (85 FR 77273), and there has been no public comment on such finding. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: S. Wyman
H. Vu

Date: September 20, 2021

SUBJECT: ARKANSAS NUCLEAR ONE, UNIT 2 - ISSUANCE OF AMENDMENT NO. 325 RE: REVISE LOSS OF VOLTAGE RELAY ALLOWABLE VALUES AND NUMBER OF DEGRADED VOLTAGE CHANNELS (EPID L-2020-LLA-0193) DATED SEPTEMBER 20, 2021

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OFFICE	NRR/DORL/LPL4/PM	NRR/DORL/LPL4/LA	NRR/DSS/STSB/BC(A)	NRR/DEX/EICB/BC
NAME	TWengert	PBlechman	NJordan (MHamm for)	MWaters
DATE	8/3/2021	8/2/2021	8/5/2021	6/17/2021
OFFICE	NRR/DEX/EEEB/BC	OGC NLO	NRR/DORL/LPL4/BC	NRR/DORL/LPL4/PM
NAME	BTitus	STurk	JDixon-Herrity	TWengert
DATE	6/3/2021	9/14/2021	9/16//2021	9/20/2021

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