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

January 18, 2018

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

SUBJECT: ARKANSAS NUCLEAR ONE, UNIT 2 - ISSUANCE OF AMENDMENT TO EXCLUDE EXERCISE OF CONTROL ELEMENT ASSEMBLY 4 WITH RESPECT TO SURVEILLANCE REQUIREMENT 4.1.3.1.2 FOR THE REMAINDER OF CYCLE 26 **(EXIGENT CIRCUMSTANCES)** (EPID L-2017-LLA-0431)

Dear Sir or Madam:

The U.S. Nuclear Regulatory Commission has issued the enclosed Amendment No. 308 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 December 28, 2017.

The amendment modifies a note to TS Surveillance Requirement (SR) 4.1.3.1.2, such that Control Element Assembly (CEA) 4 may be excluded from the remaining quarterly performances of the SR in Cycle 26. The amendment will allow you to delay exercising CEA 4 until after repairs can be made during the next outage.

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

Sincerely,

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. 308 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. 308
Renewed License No. NPF-6

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

   A. The application for amendment by Entergy Operations, Inc. (the licensee), dated December 28, 2017, 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 license 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. 308, are hereby incorporated in the renewed license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. The license amendment is effective as of its date of issuance and shall be implemented as soon as practicable and prior to the time in which Surveillance Requirement 4.1.3.1.2 must be completed.

FOR THE NUCLEAR REGULATORY COMMISSION

Robert J. Pascarelli, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

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

Date of Issuance: January 18, 2018

ATTACHMENT TO LICENSE AMENDMENT NO. 308

RENEWED FACILITY OPERATING LICENSE NO. NPF-6

ARKANSAS NUCLEAR ONE, UNIT 2

DOCKET NO. 50-368

Replace the following pages of the Renewed Facility Operating License No. NPF-6 and 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.

Operating License

REMOVE	INSERT
3	3

Technical Specifications

REMOVE	INSERT
3/4 1-18	3/4 1-18

(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. 308, 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.

ACTION: (Continued)

e. With more than one CEA misaligned from any other CEA in its group by more than 7 inches (indicated position), be in at least HOT STANDBY within 6 hours.

SURVEILLANCE REQUIREMENTS

4.1.3.1.1 The position of each CEA shall be determined to be within 7 inches (indicated position) of all other CEAs in its group at least once per 12 hours.

4.1.3.1.2 Each CEA not fully inserted in the core shall be determined to be OPERABLE by movement of at least 5 inches in any one direction at least once per 92 days. (Note 1)

Note 1 - Movement of CEA 4 is not required for the remainder of Cycle 26. If an outage of sufficient duration occurs prior to the end of Cycle 26, maintenance activities will be performed to restore the CEA.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 308 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 December 28, 2017 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17362A550), Entergy Operations, Inc. (Entergy, the licensee) requested a change to the Technical Specifications (TSs) for Arkansas Nuclear One, Unit 2 (ANO-2). The proposed (one-time) amendment would modify a note to TS Surveillance Requirement (SR) 4.1.3.1.2, such that Control Element Assembly (CEA) 4 may be excluded from the remaining quarterly performances of the SR in Cycle 26. The proposed amendment would allow the licensee to delay exercising CEA 4 until after repairs can be made during the next outage.

As discussed in its application dated December 28, 2017, the licensee requested that the proposed amendment be processed by the U.S. Nuclear Regulatory Commission (NRC) on an exigent basis in accordance with the provisions in Title 10 of the *Code of Federal Regulations* (10 CFR) paragraph 50.91(a)(6). The NRC staff's evaluation regarding the exigent circumstances is discussed in Section 4.0 of this safety evaluation.

2.0 REGULATORY EVALUATION

2.1 System Description

ANO-2 has 81 CEAs that are used for reactivity control. The CEAs are divided into 9 control groups, of which 2 are Shutdown Groups designated as Groups A and B, 6 are Regulating Groups designated as Groups 1 through 6, and one group is designated as Group P. CEA 4 is in Shutdown Group B. Shutdown groups A and B are the first withdrawn during startup and the last inserted during a planned shutdown. On a reactor startup, Groups 1 through 5 must be withdrawn in a prescribed sequence and with the prescribed overlap. Groups 6 and P are the last groups to be withdrawn during reactor startup. During power operations, insertion of Groups 1 through 5 and Groups A and B is prohibited, except during performance of SR 4.1.3.1.2. Thus, during power operations, CEA 4 is required to be fully withdrawn, except for the performance of SR 4.1.3.1.2.

The Control Element Drive Mechanism Control System (CEDMCS) is an electromechanical device that uses induced magnetic fields to operate a mechanism for moving a CEA. Withdrawal or insertion of CEAs is accomplished by applying programmed voltage levels, in the proper sequence, to all five control element drive mechanism coils. The initial condition of a CEA prior to receiving a motion command is the "holding" mode. In this mode the upper gripper coil (UGC) is energized at low voltage, engaging the upper gripper latch within the drive shaft. During normal plant operation when conditions do not require CEA movement, all 81 CEAs will be in the "holding" mode with the UGC energized at low voltage.

A reactor trip is accomplished by rapid insertion of the CEAs when the CEDMCS coils are de-energized. When this happens, the latches are disengaged from the drive shaft and the CEAs fully insert into the core by means of gravity.

2.2 Applicable Regulatory Requirements

Section 182a of the Atomic Energy Act of 1954, as amended, requires applicants for nuclear power plant operating licenses to include TSs as part of the license. The Commission's regulatory requirements related to the content of the TSs are contained in 10 CFR 50.36, "Technical specifications." The TS requirements in 10 CFR 50.36 include the following categories: (1) safety limits, limiting safety systems settings and control settings, (2) limiting conditions for operation (LCOs), (3) SRs, (4) design features, and (5) administrative controls.

Surveillance requirements are defined in 10 CFR 50.36(c)(3) as 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.

ANO-2 was designed and constructed to meet the intent of the Atomic Energy Commission's (AEC's) general design criteria (GDC), as originally proposed in July 1967, and thus, the design and construction were initiated and proceeded to a significant extent based upon the criteria proposed in 1967. The ANO-2 Safety Analysis Report, Section 3.1, "Conformance with AEC General Design Criteria," describes the manner in which the ANO-2 GDC meet the intent of the corresponding GDC published as Appendix A of 10 CFR Part 50 in 1971. The regulations in 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants," include the following GDC applicable to CEA design requirements, as described in this license amendment request:

- GDC 23, "Protection system failure modes," states that "The protection system shall be designed to fail into a safe state or into a state demonstrated to be acceptable on some other defined basis if conditions such as disconnection of the system, loss of energy (e.g., electric power, instrument air), or postulated adverse environments (e.g., extreme heat or cold, fire, pressure, steam, water, and radiation) are experienced."

- GDC 25, "Protection system requirements for reactivity control malfunctions," states that "The protection system shall be designed to assure that specified acceptable fuel design limits are not exceeded for any single malfunction of the reactivity control systems, such as accidental withdrawal (not ejection or dropout) of control rods."

- GDC 26, "Reactivity control system redundancy and capability," states that "Two independent reactivity control systems of different design principles shall be provided. One of the systems shall use control rods, preferably including a positive means for

inserting the rods, and shall be capable of reliably controlling reactivity changes to assure that under conditions of normal operation, including anticipated operational occurrences, and with appropriate margin for malfunctions such as stuck rods, specified acceptable fuel design limits are not exceeded. The second reactivity control system shall be capable of reliably controlling the rate of reactivity changes resulting from planned, normal power changes (including xenon burnout) to assure acceptable fuel design limits are not exceeded. One of the systems shall be capable of holding the reactor core subcritical under cold conditions."

- GDC 27, "Combined reactivity control systems capability," states that "The reactivity control systems shall be designed to have a combined capability, in conjunction with poison addition by the emergency core cooling system, of reliably controlling reactivity changes to assure that under postulated accident conditions and with appropriate margin for stuck rods the capability to cool the core is maintained."

- GDC 28, "Reactivity limits," states that "The reactivity control systems shall be designed with appropriate limits on the potential amount and rate of reactivity increase to assure that the effects of postulated reactivity accidents can neither (1) result in damage to the reactor coolant pressure boundary greater than limited local yielding nor (2) sufficiently disturb the core, its support structures or other reactor pressure vessel internals to impair significantly the capability to cool the core. These postulated reactivity accidents shall include consideration of rod ejection (unless prevented by positive means), rod dropout, steam line rupture, changes in reactor coolant temperature and pressure, and cold water addition."

- GDC 29, "Protection against anticipated operational occurrences," states that "The protection and reactivity control systems shall be designed to assure an extremely high probability of accomplishing their safety functions in the event of anticipated operational occurrences."

2.3. Proposed TS Change

Technical specification LCO 3.1.3.1 states "All CEAs shall be OPERABLE with each CEA of a given group positioned within 7 inches (indicated position) of all other CEAs in its group" during startup and power operation. The bases or reasons for TS 3/4.1.3 "MOVABLE CONTROL ASSEMBLIES" state that the specifications ensure that (1) acceptable power distribution limits are maintained, (2) the minimum shutdown margin (SDM) is maintained, and (3) the potential effects of CEA misalignments are limited to acceptable levels. The bases further state that a stuck or untrippable CEA, or a misalignment of two or more CEAs, requires a prompt shutdown of the reactor since either of these conditions may be indicative of a possible loss of mechanical functional capability of the CEA(s).

To assure that LCO 3.1.3.1 is met, SR 4.1.3.1.2 requires that "Each CEA not fully inserted in the core shall be determined to be OPERABLE by movement of at least 5 inches in any one direction at least once per 92 days. (Note 1)." The current Note 1 to SR 4.1.3.1.2 states: "Movement of CEA 18 is not required for the remainder of Cycle 24. If an outage of sufficient duration occurs prior to the end of Cycle 24, maintenance activities will be performed to restore the CEA."

The revised Note 1 to SR 4.1.3.1.2 would change CEA 18 to CEA 4 and Cycle 24 to Cycle 26 as follows:

> Movement of CEA 4 is not required for the remainder of Cycle 26. If an outage of sufficient duration occurs prior to the end of Cycle 26, maintenance activities will be performed to restore the CEA.

The licensee requested the proposed change due to a degrading UGC, which normally holds the CEA in place. Should the UGC fail during CEA movement (i.e., during performance of SR 4.1.3.1.2), the CEA will drop into the core, resulting in a reactivity transient and subsequent power reduction, and could result in a plant shutdown if the CEA is deemed to be unrecoverable.

3.0 TECHNICAL EVALUATION

3.1 NRC Staff Evaluation

The licensee's proposed revision to the ANO-2 TSs would eliminate exercising CEA 4 for SR 4.1.3.1.2 for the remainder of operating Cycle 26, currently scheduled to end in September 2018. The purpose of SR 4.1.3.1.2 is to verify that the CEAs are moveable and trippable (i.e., free from mechanical binding). The proposed revision would effectively allow CEA 4 to not be exercised during the remaining three quarterly performances of SR 4.1.3.1.2. The NRC staff reviewed the proposal to determine if the revised SR 4.1.3.1.2 would, along with the unchanged associated surveillance requirements, assure that LCO 3.1.3.1 will be met, in that the SR assures that the CEAs are not stuck or untrippable. The staff also assessed how the mechanical binding of CEA 4 would impact the shutdown margin.

Potential Causes of Failure

During its review of data from the most recent fall 2017 CEA freedom of movement surveillance on September 29, 2017, the licensee discovered that the UGC current trace for CEA 4 was found to have more "noise" than expected. The current was measured at 5 amperes (amps), while the normal current is 4 amps. The licensee stated that this is an indication of degradation in the UGC and, in order to limit further degradation of the UGC, the licensee de-energized the UGC and energized the lower gripper coil to hold CEA 4 in place. In order to track additional degradation, the licensee measured the CEA 4 UGC current on December 12, 2017, and observed a current of 7 amps, which demonstrated further degradation of the UGC. The licensee noted that CEA 4 is the only coil exhibiting this behavior at this time and that all UGCs are currently scheduled to be replaced in the next ANO-2 refueling outage (fall 2018) with new high temperature coils.

While the licensee has not determined a definitive cause, the licensee described potential causes including shorted turns in the UGC winding and degradation of the firing circuit. Based on industry experience, the licensee stated that a shorted-winding condition is the most common cause of coil failure and occurs when the insulation resistance, or dielectric, fails within a winding, allowing a secondary, or parasitic, current path. Although a single shorted turn in a winding may not have an immediate effect on a coil's performance, the point of dielectric failure becomes a source of additional heat, which leads to additional degradation as the coil is energized.

The licensee stated that the power switch components or the coil driver card could also fire the circuit improperly, generating higher current draw and improper traces, however, coil driver card failures typically result in a full firing of the circuitry even when not activated. The licensee noted

that the increase in current and the observed similar traces for a previous coil failure make the opto-isolator a secondary cause and not the most probable. In addition, troubleshooting and repair of a failed opto-isolator or coil driver card normally requires use of the Hold Bus and the UGC to hold the rod in place while the power switch is removed. However, as noted by the licensee, further troubleshooting in this regard is not considered to be in the best interest of nuclear safety since the failure modes of the UGC previously described could result in a plant transient and/or shutdown as the rod would drop into the core if the UGC failed during troubleshooting efforts.

The licensee stated that the control element drive system is designed to ensure that electrical problems will not prevent the insertion of a CEA into the core when the reactor trip circuit breakers (RTCBs) are opened. The RTCBs open upon an automatic or manual reactor trip signal, removing all power from both control and holding circuitry. All coils on each CEDMCS subsequently de-energize, resulting in all CEAs inserting into the core by means of gravity. This design is fail-safe in that a loss of power, regardless of whether a reactor trip signal has been generated, will result in the CEAs inserting into the core. The licensee stated that each CEA is magnetically coupled to its associated gripper coil and there is no physical (mechanical) coupling between the CEDMCS circuit/coil and the associated gripper. Any postulated failure mechanism that could prevent rod insertion (such as mechanical binding of the CEA itself) is not influenced or impacted by coil failure or control or holding circuitry failures. The licensee found no postulated failure mechanisms where the coil or associated circuitry could physically prevent rod insertion once the RTCBs have opened. The licensee stated that CEA 4 remains trippable (i.e., free to move) as demonstrated by the last performance of SR 4.1.3.1.2 in the fall of 2017.

Assessment of Revised Note 1

The NRC staff assessed the above statements by the licensee, and considered related operating experience, and the short duration of the requested change to the SR. ANO-2 has not experienced issues with mechanical binding, and recently demonstrated that CEA 4 was not mechanically bound. Operating experience at similar plants likewise shows that CEA mechanical binding is unlikely. Additionally, the change to the SR is of short duration – to the end of the current cycle only – and eliminates three surveillances that would otherwise occur. Last, the modified Note 1 only affects one CEA; surveillances of CEAs other than CEA 4 are not changed. Therefore, SR 4.1.3.1.2, as modified by revised Note 1, and in conjunction with the other associated and unchanged surveillance requirements, will continue to assure that LCO 3.1.3.1 is met.

Reactivity Impact of Undetected Failure to Meet LCO 3.1.3.1

As described above, the NRC staff determined that SR 4.1.3.1.2, as revised, assures that LCO 3.1.3.1 is met. The CEAs, including CEA 4, will insert into the core when required; there is a low likelihood that CEA 4 will become mechanically bound during the remainder of the cycle. Given that CEA 4 is still expected to insert into the core following receipt of a reactor trip signal, the staff finds that the existing Chapter 15 accident analysis remains bounding. Chapter 15, "Accident Analysis," of the ANO-2 Safety Analysis Report assumes that the most reactive CEA is stuck in the fully withdrawn position.

However, the potential impact on SDM of the hypothetical failure of the highest reactivity combination of CEA 4 and a second CEA failing to insert on reactor trip was analyzed by the licensee. The TSs for SDM, TS 3.1.1.1 for Modes 1 through 4 and TS 3.1.1.2 for Mode 5, specifies that the SDM shall be greater than or equal to that specified in the Core Operating

Limits Report (COLR). The licensee stated that the Cycle 26 COLR SDM operating limit is 5.0 percent Δk/k (delta-k/k where k is k-effective, the effective multiplication factor) in Modes 1 through 5.

The licensee performed calculations for various effective full power days throughout the remainder of Cycle 26 to determine the minimum SDM that would exist following a reactor trip assuming the highest reactivity worth combination of CEA 4 and a second CEA fail to insert. The licensee-calculated minimum SDM for this scenario was found to be 6.0167 percent Δk/k at end of cycle, which is above the 5.0 percent Δk/k SDM requirement in the COLR. The licensee stated that the calculated SDM value bounds operation for the remainder of ANO-2 Cycle 26 operation. In addition, the licensee noted that this calculation does not take into account required operator action to add borated water in the event a CEA does not fully insert into the core following reactor trip. The licensee concluded that the SDM in excess of the COLR limit of 5.0 percent Δk/k exists for the remainder of ANO-2 Cycle 26 operation, even if CEA 4 fails to insert into the core during a reactor trip. The licensee stated that calculations were performed using the same NRC-approved models and methodologies as those used to perform the TS SRs.

Part of the bases for LCO 3.1.3.1 is to maintain a minimum SDM. The NRC staff reviewed the summary of the licensee's analysis of the impact of CEA 4 failing to drop into the core during a reactor trip. The NRC staff finds that the licensee's calculations, which assumed that CEA 4 and the single highest reactivity worth CEA fail to insert, are adequate given that they were performed using NRC-approved models and methodologies. Based on the above, the NRC staff finds that even if CEA 4 and the CEA of highest worth fail to insert into the core, the available SDM would be greater than the SDM required by the COLR. In addition, as previously stated, SR 4.1.3.1.2 is adequate to preclude this occurrence.

3.2 Technical Evaluation Conclusion

The NRC staff reviewed the license amendment request provided by the licensee to revise Note 1 of SR 4.1.3.1.2 to exclude CEA 4 from the remaining quarterly performances during Cycle 26 and determined that the licensee has provided adequate information for its justification of excluding CEA 4 from SR performance for the remainder of Cycle 26. Specifically, the licensee has (1) adequately addressed the failure modes and possible causes of the problems identified with CEA 4, (2) established that CEA 4 will insert into the core with reasonable certainty if a reactor trip signal is generated, and (3) shown that there is adequate shutdown margin even if CEA 4 fails to insert into the core. Additionally, the staff concludes that elimination of the surveillance of CEA 4 for the remainder of Cycle 26 will reduce the likelihood of a potential rod drop accident and associated reactivity transient. Therefore, the NRC staff concludes that the elimination of exercising CEA 4 for performance of SR 4.1.3.1.2 for the remainder of Cycle 26 is acceptable because SR 4.1.3.1.2 will continue to play its role in assuring that LCO 3.1.3.1 is met. Further, even if CEA 4 fails to drop into the core during a reactor trip (i.e., is mechanically bound), the SDM will be met.

4.0 EXIGENT CIRCUMSTANCES

4.1 Background

As discussed in the licensee's application dated December 28, 2017, the licensee requested that the proposed amendment be processed by the NRC on an exigent basis.

The NRC's regulations contain provisions for issuance of amendments when the usual 30-day public comment period cannot be met. These provisions are applicable under exigent circumstances. Consistent with the requirements in 10 CFR 50.91(a)(6), exigent circumstances exist when: (1) a licensee and the NRC must act quickly; (2) time does not permit the NRC to publish a *Federal Register* notice allowing 30 days for prior public comment; and (3) the NRC determines that the amendment involves no significant hazards consideration.

Under the provisions in 10 CFR 50.91(a)(6), the NRC notifies the public in one of two ways: (1) by issuing a *Federal Register* notice providing an opportunity for hearing and allowing at least 2 weeks from the date of the notice for prior public comments; or (2) by using local media to provide reasonable notice to the public in the area surrounding the licensee's facility. In this case, the NRC used the second approach and published a public notice in the *Arkansas Democrat-Gazette*, located in Little Rock, Arkansas 72203 (http://arkansasonline.com), a newspaper local to the licensee's facility, from January 6 through January 7, 2018.

4.2 Licensee's Basis for Exigent Circumstances

The licensee is basing exigent circumstances on the following:

On September 29, 2017, the licensee discovered that CEA 4 UGC had degraded; however, the primary safety function of the CEAs is to insert into the core upon a reactor trip signal, and this function is not impacted by the UGC degradation. The licensee had planned to exercise the CEA on the next scheduled test in January 2018, and assess any change in degradation during that test. In December 2017, the licensee identified additional degradation of the CEA 4 UGC and determined that the potential of a CEA drop would be substantial during performance of the January 2018 exercise test. The licensee concluded that should the UGC fail during CEA movement, the CEA would drop into the core, resulting in a reactivity transient and subsequent power reduction, and could result in a plant shutdown, if the CEA is determined to be unrecoverable.

NRC Staff Conclusion

The licensee and the Commission must act quickly because, if the NRC staff does not approve the amendment request and the licensee does not implement the amendment by January 22, 2018, then the licensee must perform SR 4.1.3.1.2. Quick action by the licensee and the staff eliminates the need to perform the SR by that date, and will decrease the potential for a plant transient if the degraded UGC fails during the testing. The licensee subsequently acted quickly in that it made a timely application for the proposed amendment following identification of the issue. In addition, the NRC staff finds that the licensee could not avoid the exigency because the degraded condition of the UGC for CEA 4 was not discovered in sufficient time to permit the normal public noticing period. Based on these findings, and the determination that the amendment involves no significant hazards consideration as discussed below, the NRC staff has determined that a valid need exists for issuance of the license amendment using the exigent provisions of 10 CFR 50.91(a)(6).

5.0 PUBLIC COMMENTS

Under the provisions in 10 CFR 50.91(a)(6), the NRC notifies the public in one of two ways: (1) by issuing a *Federal Register* notice providing an opportunity for hearing and allowing at least 2 weeks from the date of the notice for prior public comments; or (2) by using local media to provide reasonable notice to the public in the area surrounding the licensee's facility. In this case, the NRC used the second approach and published a public notice in the *Arkansas Democrat-Gazette*, located in Little Rock, Arkansas 72203 (http://arkansasonline.com), a newspaper local to the licensee's facility, from January 6 through January 7, 2018. The notice included the NRC staff's proposed no significant hazards consideration determination. The notice also provided an opportunity for public comment until 4:15 p.m. Eastern Time on January 12, 2018, regarding the staff's proposed no significant hazards consideration determination.

No public comments were received regarding the proposed amendment.

6.0 FINAL NO SIGNIFICANT HAZARDS CONSIDERATION

The NRC's regulation in 10 CFR 50.92(c) states that the NRC may make a final determination, under the procedures in 10 CFR 50.91, that a license amendment involves no significant hazards consideration if operation of the facility, in accordance with the amendment, would not: (1) involve a significant increase in the probability or consequences of an accident previously evaluated; or (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) involve a significant reduction in a margin of safety.

As required by 10 CFR 50.91(a), in its application dated December 28, 2017, the licensee provided its analysis of the issue of no significant hazards consideration, which is presented below:

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No.

   One function of the CEAs is to provide a means of rapid negative reactivity addition into the core. This occurs upon receipt of a signal from the Reactor Protection System (RPS). This function will continue to be accomplished with the approval of the proposed change. Typically, once [every] 92 days each CEA is moved at least five inches to ensure the CEA is free to move. CEA 4 remains trippable (free to move) as illustrated by the last performance of SR 4.1.3.1.2 in the fall of 2017. However, due to abnormally high coil voltage and current measured on the CEA 4 Upper Gripper Coil (UGC), future exercising of the CEA could result in the CEA inadvertently inserting into the core, if the UGC were to fail during the exercise test. The mis-operation of a CEA, which includes a CEA drop event, is an abnormal occurrence and has been previously evaluated as part of the ANO-2 accident analysis. Inadvertent CEA insertion will result in a reactivity transient and power reduction, and could lead to a reactor shutdown if the CEA is deemed to be unrecoverable. The proposed change would minimize the potential for inadvertent

insertion of CEA 4 into the core by maintaining the CEA in place using the Lower Gripper Coil (LGC), which is operating normally. The proposed change will not affect the CEA's ability to insert fully into the core upon receipt of a reactor trip signal.

No modifications are proposed to the RPS or associated Control Element Drive Mechanism Control System (CEDMCS) logic with regard to the ability of CEA 4 to remain available for immediate insertion. The accident mitigation features of the plant are not affected by the proposed amendment. Because CEA 4 remains trippable, no additional reactivity considerations need to be taken into consideration. Nevertheless, Entergy has evaluated the reactivity consequences associated with failure of CEA 4 to insert upon a reactor trip in accordance with TS requirements for Shutdown Margin (SDM) and has determined that SDM requirements would be met should such an event occur at any time during the remainder of Cycle 26 operation.

Therefore, this change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No.

CEA 4 remains trippable. The proposed change will not introduce any new design changes or systems that can prevent the CEA from [performing] its specified safety function. As discussed previously, CEA mis-operation has been previously evaluated in the ANO-2 accident analysis. Furthermore, SDM has been shown to remain within limits should an event occur at any time during the remainder of operating Cycle 26 such that CEA 4 fails to insert into the core upon receipt of a reactor trip signal.

Therefore, this change does not create the possibility of a new or different kind of accident from an accident previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

Response: No.

SR 4.1.3.1.2 is intended to verify CEAs are free to move (i.e., not mechanically bound). The physical and electrical design of the CEAs, and past operating experience, provides high confidence that CEAs remain trippable whether or not exercised during each SR interval. Excluding further exercising of CEA 4 for the remainder of Cycle 26 operation does not directly relate to the potential for CEA binding to occur. No mechanical binding has been previously experienced at ANO-2. CEA 4 is contained within a Shutdown CEA Bank and is not used for reactivity control during power maneuvers (the CEA must remain

fully withdrawn at all times when the reactor is critical). In addition, Entergy has concluded that required SDM will be maintained should CEA 4 fail to insert following a reactor trip at any point during the remainder of Cycle 26 operation.

Therefore, this change does not involve a significant reduction in a margin of safety.

The NRC staff reviewed the licensee's no significant hazards consideration analysis. Based on the review and on the NRC staff's evaluation of the underlying license amendment request as discussed above, the NRC staff concludes that the three standards of 10 CFR 50.92(c) are satisfied. Therefore, the NRC staff has made a final determination that no significant hazards consideration is involved for the proposed amendment and that the amendment should be issued as allowed by the criteria contained in 10 CFR 50.91.

7.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Arkansas State official was notified of the proposed issuance of the amendment on January 8, 2018. The State official had no comments.

8.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes a surveillance requirement. 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 *Arkansas Democrat-Gazette* on January 6 and 7, 2018. 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.

9.0 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 Contributor: R. Beaton, NRR

Date: January 18, 2018

SUBJECT: ARKANSAS NUCLEAR ONE, UNIT 2 - ISSUANCE OF AMENDMENT TO EXCLUDE EXERCISE OF CONTROL ELEMENT ASSEMBLY 4 WITH RESPECT TO SURVEILLANCE REQUIREMENT 4.1.3.1.2 FOR THE REMAINDER OF CYCLE 26 **(EXIGENT CIRCUMSTANCES)** (EPID L-2017-LLA-0431) DATED JANUARY 18, 2018

DISTRIBUTION:
PUBLIC
PM File Copy
RidsACRS_MailCTR Resource
RidsNrrDorlLpl4 Resource
RidsNrrDssStsb Resource
RidsNrrLAPBlechman Resource
RidsNrrPMANO Resource
RidsRgn4MailCenter Resource
RidsNrrDssSrxb Resource
RBeaton, NRR

ADAMS Accession No. ML18011A064 **by email *by memorandum

OFFICE	NRR/DORL/LPL4/PM	NRR/DORL/LPL4/LA	NRR/DSS/SRXB/BC(A)*	NRR/DSS/STSB/BC**
NAME	TWengert	PBlechman	JWhitman (DWoodyatt for)	VCusumano
DATE	01/17/2018	01/17/2018	01/09/2018	01/12/2018
OFFICE	OGC – NLO**	NRR/DORL/LPL4/BC	NRR/DORL/LPL4/PM	
NAME	DRoth	RPascarelli	TWengert	
DATE	01/17/2018	01/18/2018	01/18/2018	

OFFICIAL RECORD COPY