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Richard L. Anderson
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2CAN051702

May 30, 2017

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

Subject: Licensee Event Report 50-368/2017-001-00
Arkansas Nuclear One, Unit 2
Docket No. 50-368
License No. NPF-6

Dear Sir or Madam:

Pursuant to the reporting requirements of 10 CFR 50.73, attached is the subject Licensee Event Report concerning the identification of inadequate protection from tornado missiles due to nonconforming design conditions for Arkansas Nuclear One, Unit 2.

There are no new commitments contained in this submittal.

Should you have any questions concerning this issue, please contact Stephenie Pyle, Manager, Regulatory Assurance, at 479-858-4704.

Sincerely,

ORIGINAL SIGNED BY RICHARD L ANDERSON

RLA/rwc

Attachment: Licensee Event Report 50-368/2017-001-00

cc: Mr. Kriss Kennedy
Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
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NRC FORM 366 (04-2017) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 03/31/2020

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Information Services Branch (T-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See Page 2 for required number of digits/characters for each block)

(See NUREG-1022, R.3 for instruction and guidance for completing this form http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Arkansas Nuclear One – Unit 2	05000368	1 OF 5

4. TITLE **Inadequate Protection from Tornado Missiles Identified Due to Nonconforming Design Conditions**

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									N/A	
04	06	2017	2017	001	00	05	30	2017	FACILITY NAME	DOCKET NUMBER
									N/A	

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*			
6	☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
	☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☒ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
	☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
	☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
10. POWER LEVEL	☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
	☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
0	☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(C)	☐ 73.77(a)(1)
	☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☒ 50.73(a)(2)(v)(D)	☐ 73.77(a)(2)(i)
	☐ 20.2203(a)(2)(vi)	☒ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(vii)	☐ 73.77(a)(2)(ii)
		☐ 50.73(a)(2)(i)(C)	☐ OTHER Specify in Abstract below or in NRC Form 366A	

12. LICENSEE CONTACT FOR THIS LER

LICENSEE CONTACT	TELEPHONE NUMBER *(Include Area Code)*
Stephenie L. Pyle, Manager, Regulatory Assurance	479 858-4704

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO				

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On April 6, 2017, as part of the closure of an Arkansas Nuclear One, Units 1 and 2 (ANO-1 & 2) Tornado Protection Study, a nonconforming condition in the plant design for a conduit that contains safety related cables for the ANO-2 #1 Emergency Diesel Generator (EDG) meter and relay cabinets, was identified. The conduit did not meet current design basis for protection against a potential tornado missile impact. This vulnerability is similar to those previously reported in LERs associated with ANO-1.

On April 6, 2017, Operations declared the #1 EDG inoperable, implemented Enforcement Guidance Memorandum (EGM) 15-002, "Enforcement Discretion for Tornado-Generated Missile Protection Noncompliance," along with necessary compensatory measures, and subsequently declared the affected equipment operable but non-conforming. Interim corrections include implementation of compensatory strategies. Plant modifications and license basis changes are being evaluated to resolve outstanding issues.

The cause of this issue was unclear and changing regulatory requirements during original plant licensing that led to an inadequate understanding of the regulatory guidance with respect to tornado missile protection design requirements.

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Arkansas Nuclear One, Unit 2	05000-368	2017	**001**	**00**

NARRATIVE

A. BACKGROUND NRC DOCUMENTS

Enforcement Guidance Memorandum (EGM) 15-002, "Enforcement Discretion for Tornado-Generated Missile Protection Noncompliance," provides guidance to exercise enforcement discretion when an operating power reactor licensee does not comply with a plant's current site-specific licensing basis for tornado-generated missile protection. Specifically, discretion would apply to the applicable Technical Specification (TS) Limiting Condition(s) for Operation (LCO) that would require a reactor shutdown or mode change in the event a licensee could not meet TS LCO required action(s) within the TS completion time.

Interim Staff Guidance DSS-ISG-2016-01, "Clarification of Licensee Actions in Receipt of Enforcement Discretion Per Enforcement Guidance Memorandum EGM 15-002," provides interim staff guidance to facilitate staff understanding of expectations for consistent oversight associated with implementing enforcement discretion for tornado missile protection noncompliance(s) per EGM 15-002.

Appendix A of DSS-ISG-2016-01 provides guidance for acceptable initial and comprehensive compensatory measures for licensee use in implementing the enforcement discretion outlined in EGM 15-002. The licensee should declare (log) the utilization of EGM 15-002, inform the resident inspector, and enter the issue into the corrective action program. For initial compensatory measures, it is expected that the measures listed are already in place at sites that may be affected by severe weather, such as tornados and/or hurricane force winds. The measures should be verified as current and readily deployable within a very short timeframe.

B. PLANT STATUS

ANO-2 was operating at 0% rated thermal power in Mode 6 when this condition was discovered. There were no other structures, systems, or components (SSCs) that were inoperable at the time that contributed in the event.

C. DESCRIPTION OF EVENT

As a part of the closure of an ANO Tornado Protection Study, a tornado-generated missile vulnerability was identified on April 6, 2017. The vulnerability is associated with a conduit in the ANO-2 Fire Brigade Area on the 386 foot elevation of the ANO-2 Auxiliary Building. A western bound missile could strike the conduit in the Fire Brigade area above the ceiling tiles. Subsequent walk downs determined that only the western bound missile is creditable. This conduit contains the cables for instrumentation, controls, and interlocks for the #1 Emergency Diesel Generator (EDG)[EK].

The #1 EDG was declared inoperable and enforcement discretion per EGM 15-002 was implemented for the above issue and appropriate existing compensatory actions verified within the time allowed by the applicable LCOs. This condition has been entered into the ANO correction action program (CR-ANO-2-2017-1555). The guidance provided in EGM 15-002, with reference to Appendix A of DSS-ISG-2016-01, was utilized to address the compensatory measures that may be applicable to this condition.

This vulnerability is similar to the ones identified in ANO-1 LER 2016-002-00, dated August 11, 2016 (ML16224A767), and ANO-1 LER 2016-003-00 dated October 19, 2016 (ML16293A664).

D. EVENT CAUSES

The identified condition is a design legacy issue. The cause of this issue was unclear and changing regulatory requirements during original plant licensing that led to an inadequate understanding of the regulatory guidance with respect to tornado missile protection design requirements.

E. CORRECTIVE ACTIONS

The following corrective actions were completed upon identification of each individual vulnerability:

- The ANO directive (COPD-038) for implementing the respective enforcement discretion was completed for this condition. The actions completed ensure compliance with the requirements of EGM 15-002.
- The status of the affected TS components was documented in the Station Log.
- The NRC resident inspector and the ANO Operating crews were briefed with respect to the equipment that could be potentially affected during a site tornado event and the compensatory actions identified to both minimize the potential for tornado missiles during severe weather and to mitigate the consequences of potential tornado missiles.

The following corrective actions have been taken to further address the condition. Note that EGM 15-002 requires follow-up actions to be completed within 60 days following tornado vulnerability identification which resulted in application of the enforcement discretion. These actions are in addition to those established upon initial identification of tornado missile vulnerability and intended to provide a discernable, safety beneficial change, when compared with the initially established compensatory measures.

- Appropriate procedures and directives have been revised to address the SSC impact per area identified above.
- Operations personnel remain abreast of the tornado missile vulnerabilities and the established compensatory measures. Operations personnel are trained with respect to preparation for and the mitigation of natural events such as tornados. Procedures currently available cover events such as natural emergencies (includes tornado events), loss of offsite power, station blackout, and FLEX (diverse and flexible coping strategies) for beyond design basis events, along with the aforementioned ANO directive (COPD-038).

Additional longer term corrective actions are being considered. Options include the development and installation of a plant modification which bring affected areas into compliance with tornado missile protection standards as applicable to the ANO-2 licensing basis. Additional options include the application of Revision 1 of Regulatory Guide 1.76 or the use of other evaluation methods such as the Tornado Missile (TORMIS) code or the Tornado Missile Risk Evaluator (TMRE), either of which would require a license amendment request and subsequent NRC approval.

F. SAFETY CONSEQUENCES

This condition had no actual safety consequences impacting plant or public safety since ANO-2 has not experienced a tornado missile event.

As documented per EGM 15-002, tornado missile scenarios that may lead to core damage are very low probability events because safety-related SSCs are typically designed to withstand the effects of tornados. For a tornado missile-induced scenario to occur, a tornado would have to impact the site and result in the generation of missiles that would contact and fail vulnerable, unprotected safety-related equipment and/or unprotected safety-related subcomponents in a manner that is non-repairable and non-recoverable. In addition, because plants are designed with redundancy and diversity, the tornado missiles would have to affect multiple trains of safety systems and/or means of achieving safe shutdown.

The NRC has completed a generic risk analysis of potential tornado missile protection non-compliances to examine the risk significance for plant facilities. The generic analysis assumed that core damage would occur if a tornado hit a plant located in the most active tornado region in the country and that it caused a tornado-generated missile to fail all emergency core cooling equipment at the plant with no ability to recover. Given this conservative assumption, the staff's study established that the core damage frequency (CDF) associated with tornado missile-related non-compliances are well below CDFs requiring immediate regulatory action. In summary, the generic bounding risk analysis performed by the NRC concluded that this issue is of low risk significance.

During a postulated design basis tornado, the conditions documented could have resulted in a loss of the safety function for the EDGs, assuming the #2 EDG was already inoperable for a reason unrelated to tornado missile. This system is used to mitigate the effects of a loss of offsite power by providing an emergency AC power source.

G. BASIS FOR REPORTIBILITY

This event is reportable pursuant to the following criteria:

10 CFR 50.73(a)(2)(i)(B)	Any operation or condition which was prohibited by Technical Specifications
10 CFR 50.73(a)(2)(ii)(B)	Any event or condition that resulted in the nuclear plant being in an unanalyzed condition that significantly degraded plant safety.
10 CFR 50.73(a)(2)(v)(D)	Any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident

The guidance provided in NUREG 1022 states under 10 CFR 50.73(a)(1):

The holder of an operating license for a nuclear power plant (licensee) shall submit a Licensee Event Report (LER) for any event of the type described in this paragraph within 60 days after the discovery of the event.

H. ADDITIONAL INFORMATION

10 CFR 50.73(b)(5) states that this report shall contain reference to "any previous similar events at the same plant that are known to the licensee." NUREG 1022 reporting guidance states that term "previous occurrences" should include previous events or conditions that involved the same underlying concern or reason as this event, such as the same root cause, failure, or sequence of events.

A review of the ANO corrective action program and LERs for the previous three years was performed. Aside from LERs 2016-002-00 and 2016-003-00 mentioned previously, there were no other similar events identified at ANO during this time period.

No components failed due to this condition. The conditions identified herein were a result of extent of condition evaluation with respect to potential tornado design vulnerabilities. These vulnerabilities are legacy issues which are being addressed in accordance with EGM 15-002.

Energy Industry Identification System (EIIS) codes and component codes are identified in the text of this report as [XX].