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Jeremy G. Browning
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0CAN051401

10CFR 50.73

May 5, 2014

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

Subject: Licensee Event Report 50-313/2014-01-00
Arkansas Nuclear One, Unit 1
Docket No. 50-313
License No. DPR-51

Dear Sir or Madam:

Pursuant to the reporting requirements of 10 CFR 50.73, attached is the subject Licensee Event Report concerning Inadequate External Flood Protection for Safety-Related Equipment Located Below the Design Basis Flood Elevation."

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 Jeremy G. Browning

JGB/rmc

Attachment: Licensee Event Report 50-313/2014-001-00

cc: Mr. Marc L. Dapas
Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
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Arlington, TX 76011-4511

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NRC FORM 366 (02-2014) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 01/31/2017

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 FOIA/Privacy Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet 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 reverse for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Arkansas Nuclear One – Unit 1	05000313	1 OF 5

4. TITLE

Inadequate External Flood Protection for Safety-Related Equipment Located Below the Design Basis Flood Elevation

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
									Arkansas Nuclear One – Unit 2	05000368
3	5	2014	2014 – 001 – 00			05	05	2014	FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE

1

10. POWER LEVEL

100%

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☒ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☒ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	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
B	FK	2X02	G080	Y					

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

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

During Fukushima flooding walk downs to ensure the availability of flood protection barriers, a condition was identified which had the potential to adversely impact the ability to address external flooding conditions. Several individual pathways between both unit's Turbine Building and Auxiliary Building were identified that could bypass flood barriers. The identified pathways were for the most part scheduled and unscheduled, partially filled conduits. Configuration changes have been developed and implemented whereby these individual pathways were sealed or other isolation capabilities added. Examples of inadequate internal flood protection were also identified. In addition, the bottom of a small segment of bus work associated with the flood-protected offsite power source path was found to be below the design basis flood maximum height.

The root causes include the lack of configuration control and a lack of robust design of external flood protection barriers. Additionally, inadequate walk downs, a breakdown in the Operating Experience process, and a lack of understanding of the risk significance of flood barriers also contributed to this condition.

Mitigating strategies have been implemented for the identified conditions. Actions to correct the programmatic aspects of this condition and the inadequate flood protection barriers are in progress.

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NARRATIVE

A. Background

The design basis flood protection elevation for Arkansas Nuclear One, Units 1 and 2 (ANO-1 and ANO- 2) safety-related components and structures is 361 ft. Mean Sea Level (MSL). The design basis flood is a combination of the probable maximum flood (PMF) (358 ft. MSL), which is based on a 10,000 year probability, and the assumed coincident failure of the upstream Ozark Dam (+3 ft.).

The ANO-1 and 2 Safety Analysis Reports (SARs) state that Seismic Class/Category 1 structures are designed for the PMF of 361 ft. MSL and Seismic Class/Category 1 systems and equipment are either located on floors above 361 ft. MSL or protected by walls, waterproof doors, hatches, etc. Additionally, Startup Transformer #2 (SU2) [FK][XFMR] and its associated bus work are one of the required alternating current sources and path for off-site power. The feed from this transformer is expected to be protected against flooding up to elevation 361 ft. MSL.

B. Plant Status

At the time of the condition, ANO-1 and ANO-2 were in Mode 1 (100% power).

C. Condition Description

Over the past several months ANO has conducted walk downs as follow-up activities in response to Near-Term Task Force (NTTF) Recommendation 2.3, Flooding Walk down of the NTTF Review of Insights from the Fukushima Dai-ichi Accident. During these walk downs plant personnel documented multiple instances of ANO-1 and ANO-2 design features that may not have provided adequate external flood protection for safety-related equipment located below the design basis flood elevation of 361 ft. MSL. Examples of the identified deficient design features and procedures include:

- Missing or deficient internal conduit seals
- Missing or deficient seals
- Unsealed removable closure plates
- Missing gaskets
- Roof leaks
- Ground water intrusion through penetrations, building joints and conduits
- Degraded hatch gaskets
- Floor drain system cross connected between flood protected areas and non-flood areas

Due to the lack of designed isolation features on these pathways, the potential existed for flood waters to migrate into the Auxiliary Building where pumps and equipment required for safe shutdown are located. Some of these deficient barriers existed between the non-flood protected Turbine Building and the Auxiliary Building. Flooding of the Turbine Building from internal pipe breaks is an additional vulnerability that existed due to the degraded flood barriers that existed between these two buildings.

It has been determined that a small segment of the SU2 4160V non-segregated bus is less than five inches below the maximum design basis flood elevation of 361 ft. MSL. It is assumed that flood water at the maximum predicted flood elevation could enter the bus duct causing a fault and loss of offsite power for both ANO-1 and ANO-2.

Additionally, the Natural Emergencies procedures lack detail or omit flood barriers that require operator action to verify component position that, in some cases, are identified in design basis documents.

D. Root Causes

A root cause evaluation identified the following two root causes:

(1) There was a lack of configuration control of external flood barriers. This included controlled design drawings that do not properly display or define flood barriers (penetration seals, conduits, etc.). Additionally, operating procedures were identified that did not contain the detail necessary to ensure manual actions would be implemented resulting in the potential for ineffective response to external flooding.

(2) There was a lack of robust design of external flood protection barriers. Several instances were identified where the floor drain system was cross-connected between non-flood protected areas and flood protected areas with no method of isolation. Historically and recently, silicone foam was used as a penetration sealant. This product is not watertight and there have been instances of degradation over time. Additionally, unscheduled embedded conduits that penetrate flood barriers were not properly sealed.

The following contributing causes were also identified:

- Inadequate flood penetration barrier walk downs
- Breakdown in the Operating Experience (OE) process
- Lack of understanding of risk significant flood barriers

E. Corrective Actions

Corrective actions include:

- Where deficiencies have been identified, including the SU2 non-segregated bus, reestablishment of qualified flood barriers
- A process for notifying operations personnel when a work order breaches a flood barrier was developed
- An OE was posted to alert the industry on findings related to flood barrier walk downs
- Engineering documents are being revised to address flood barrier configuration control
- Flooding walk down reports are being verified for completeness and accuracy
- As deficiencies in the natural emergency procedures are identified, they are being revised, as applicable, to ensure operator actions for flooding mitigation are addressed
- Flood barriers will be labeled to provide in-field awareness of flood protection features
- Additional review of documentation to identify credible flood paths
- Oversight of supplemental employee performing follow-up walk downs
- Training will be developed and provided to Entergy employees that include the risk significance and importance of maintaining flood barriers.

Additional corrective actions are located in the ANO Corrective Action Program.

F. Safety Significance Evaluation

Arkansas Nuclear One is required to be protected from flooding within the station's design and licensing basis. The safety-related equipment required to mitigate the consequences of an accident were potentially affected by this condition. There are several factors which could mitigate the impact of these deficiencies depending on the specific conditions encountered during an actual event. These mitigating factors include variations in the actual flood levels and the significant warning time (days) prior to the onset of the event which would allow the application of addition resources for implementation of mitigating actions including condition identification, sealing of pathways, and water removal actions. Should mitigating strategies be delayed, the open pathways could have jeopardized the ability of the safety-related equipment to perform the design basis function during an accident. There were no actual consequences.

G. Basis for Reportabililty

10 CFR 50.73(a)(2)(ii)(B):

Any event or condition that resulted in:

(B) The nuclear power plant being in an unanalyzed condition that significantly degraded plant safety."

10 CFR 50.73(a)(2)(v)

Any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to:

(B) Remove residual heat:
(ANO-1 and ANO-2 Decay Heat Removal)

H. Previous Events

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 revealed numerous identified conditions that are both historical and present day deficiencies in the flood barrier program. The previously identified conditions contain the same underlying concerns and causes that are identified in this LER.

There have been no previous LERs submitted to identify this condition.

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