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10 CFR 50.73

1CAN111805

November 16, 2018

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

Subject: Licensee Event Report 50-313/2018-002-01
Arkansas Nuclear One, Unit 1
Docket No. 50-313
License No. DPR-51

Reference: Entergy letter dated August 10, 2018, "Licensee Event Report 50-313/2018-002-00, "Leak in Class 1 Reactor Coolant System Pressure Boundary Piping due to Cyclic Fatigue Failure on a High Pressure Injection Line Drain Tap Weld" (1CAN081804) (ML18222A210)

Dear Sir or Madam:

Pursuant to the reporting requirements of 10 CFR 50.73, attached is a supplement to Licensee Event Report 50-313/2018-002-00 (reference) concerning a leak in Class 1 Reactor Coolant System Pressure Boundary piping at Arkansas Nuclear One, Unit 1. This supplement is being submitted to update the reportability criteria related to the subject event.

There are no new commitments contained in this submittal.

Should you have any questions concerning this issue, please contact me at 479-858-4704.

Sincerely,

ORIGINAL SIGNED BY STEPHENIE L. PYLE

SLP/dkb

Attachment: Licensee Event Report 50-313/2018-002-01

cc: Mr. Kriss Kennedy
Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
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NRC FORM 366 (02-2018) 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 FOIA, Privacy and Information Collections Branch (T-5 F53), 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
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4. TITLE

Leak in Class 1 Reactor Coolant System Pressure Boundary Piping due to Cyclic Fatigue Failure on a High Pressure Injection Line Drain Tap Weld

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	
06	12	2018	2018	002	01	11	16	2018	FACILITY NAME N/A	DOCKET NUMBER

9. OPERATING MODE

3

10. POWER LEVEL

0%

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)(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)
☐ 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)
☐ 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 NUMER *(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 ICES	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO ICES
B	BQ	N/A	N/A	Y	N/A	N/A	N/A	N/A	N/A

14. SUPPLEMENTAL REPORT EXPECTED

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

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR
N/A	N/A	N/A

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

On June 12, 2018, while in Mode 3 and investigating leakage at Arkansas Nuclear One, Unit 1, a leak was identified on a drain line associated with one of the four High Pressure Injection lines which discharge to the Reactor Coolant System (RCS). The subject leak was identified during a walk down of Reactor Building structures, systems, and components initiated in response to an elevated RCS leak rate. The leak was a result of a cyclic fatigue failure originating from poor weld geometry and grinding marks present on the axial weld toe of the associated field weld. The leak was subsequently repaired and the unit returned to power operation. The corrective action plan addressed the causal factors associated with this event.

Corrective actions completed or planned include 1) similar locations were inspected for weld defects, 2) enhanced training of the specific weld type, and 3) planned mockups for future high risk / high value welds. This event had no effect on the public health and safety. The event was reported to the Nuclear Regulatory Commission on June 12, 2018, via Event Notification 53456.

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NARRATIVE

A. Plant Status

At the time this condition was identified, Arkansas Nuclear One, Unit 1 (ANO-1), was in Mode 3 performing a hot shutdown walkdown on a High Pressure Injection (HPI) [BQ] line to Reactor Coolant System (RCS) [AB] drain line near two HPI drain valves. No structures, systems or components (SSCs) were out of service at the time of this event that contributed to this event.

B. Background

Four separate HPI lines are used to supply makeup and cooling water to the ANO-1 RCS when required. After entering the Reactor Building, each line first contains a stop check valve, followed by a swing check valve, and finally a normally open manual isolation valve before reaching the RCS. Various drain and vent taps are installed in these lines near the two check valves.

The drain tap identified as having a leak in a weld was located on one of the two Loop A HPI lines between the respective stop check valve and swing check valve. The drain line contained two in-series, normally closed drain isolation valves.

Because the swing check valve is downstream of the subject drain tap, any leakage from the drain tap is expected to be HPI fluid. With HPI in operation, HPI pressure would be greater than RCS pressure. With HPI not in operation and given a leak at this drain location, the pressure at the leak point would be less than RCS pressure, causing the downstream swing check valve to seat (effectively isolating the leak path from the RCS).

The subject leak was identified during a walk down of Reactor Building SSCs following a plant shutdown due to elevated RCS leak rate. The leak was located on the drain tap between the main HPI line and the first in-series drain valve. The leak was specifically identified as a through-wall linear indication on the pipe stub and socket weld toe between the sockolet and drain valve MU-1066A.

C. Event Description

To resolve previously identified deficiencies associated with the subject two drain line valves, the valves were replaced in the Spring 2018 refueling outage. The valves were replaced with an equivalent valve and physical configuration. The majority of the welds for this modification package were completed in the fabrication shop, with only the final weld completed in the field. A qualified weld examination and liquid penetrant examination were performed at the completed field weld in the as-welded condition.

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NARRATIVE

On May 13, 2018, an elevated RCS leak rate was documented after reaching near operating pressure and temperature during initial plant heat up from the Spring 2018 refueling outage. The leak rate was closely monitored for adverse trends. On June 1, 2018, the RCS leak rate increased. On June 5, 2018, the estimated fill rate of the Reactor Building sump was 0.172 gallons per minute (gpm) and the RCS loss leak rate was calculated to be 0.346 gpm (note that the ANO-1 Technical Specification limit for unidentified leakage is ≤ 1 gpm). Chemistry sample results of the Reactor Building sump inventory were inconclusive as to the source of the leak. Multiple Reactor Building entries were performed over a three-day period which identified water leaking to the floor from the "D" Reactor Coolant Pump cavity.

Following the decision by the site to shutdown the unit and locate the source of the leak, the aforementioned drain tap on the Loop A HPI line to the "C" RCS cold leg was found leaking at a welded connection.

The leak was isolated and repaired. The drain valves were permanently removed and the drain stack was replaced with a plug.

D. Event Cause

The direct cause of the event was a cyclic fatigue failure originating from poor weld geometry and grinding marks present on the axial weld toe of the field weld.

Four causal factors of this event were identified:

1. The welds were not performed in accordance with the Entergy fleet general weld standard and the welder administrative training provided by the site. The welds were performed by qualified supplemental (contract) personnel.

2. The Entergy fleet visual examination procedure for American Society of Mechanical Engineers (ASME) piping weld joints has clear acceptance criteria for weld geometry and the presence of grinding marks on the axial toe of the weld, which should have resulted in the weld being rejected. The examinations were performed by qualified supplemental (contract) personnel.

3. Qualified welders and examiners did not follow the Entergy fleet's general welding standard guidance and the examination procedure acceptance criteria. The welds were performed by and inspected by qualified supplemental (contract) personnel.

4. While the initiation site for the weld crack was found to be at a weld grinding mark, the system induced vibrations contributed to the through wall growth of the crack.

E. Corrective Actions

The following actions have been completed:

- The direct cause was addressed by installing a welded plug at the sockolet location and removing the drain valves from the system.
- With respect to the potential extent of condition, the remaining drain/vent valves in the subject area of the HPI injection lines were examined prior to reactor restart.
- Qualifications were suspended for the personnel performing the weld during the Spring 2018 refueling outage.
- Added requirements to perform a proficiency mockup for high risk / high value welds.
- Enhanced the training requirements associated with the weld qualification program.

The following actions associated with the listed contributing causes are currently planned and captured in the corrective action program:

- Senior site management to perform a stand down with site and contract welding organizations and the visual examiners to communicate this failure and the importance of following the guidance in the general welding standard. In addition, management will communicate the requirement and importance of complying with standards, including procedural adherence and quality workmanship.
- Acceptance criteria for weld examination will be reinforced as part of the oversight plan briefing communicated by responsible Non-Destructive Examination (NDE) oversight for contract examiners.
- An Entergy welding supervisor weld inspection hold point will be implemented prior to NDE visual examinations on high risk / high value welds.
- A project plan will be proposed to study “C” HPI system vibrations.

F. Safety Significance Evaluation

Systems and components required to shutdown the reactor, maintain safe shutdown conditions, remove residual heat, and control the release of radioactive material were available at the time that this condition was discovered.

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NARRATIVE

Four separate HPI lines per train are automatically aligned upon receipt of an Engineered Safeguards signal supply cooling water to the ANO-1 RCS. One train of HPI and one train of LPI along with the Core Flooding Tanks are capable of providing 100 percent of the necessary core injection. Therefore, there were no actual consequences related to the subject event with regards to nuclear or public safety.

G. Basis for Reportability

An eight-hour non-emergency notification was reported to the NRC via Event Notification 53456 on June 12, 2018. The basis for that notification was the requirements listed in 10 CFR 50.72(b)(3)(ii)(A) and 10 CFR 50.72(b)(3)(v)(A).

The guidance in NUREG 1022 states that an LER is required. This event is reportable pursuant to the following criteria:

10 CFR 50.73(a)(2)(ii)(A) Any event or condition that resulted in:

The condition of the nuclear power plant, including its principle safety barriers, being seriously degraded.

Although the source of the RCS leakage was identified on June 12, 2018, it is assumed that the leak likely began on March 13, 2018, when the RCS leak rate increased. Once the source of the leak was identified, both the RCS and the affected HPI train were declared inoperable. Assuming the leak initiated on March 13, 2018, the unit was not shutdown within a timeframe commensurate with applicable TS requirements. Therefore, this event is also reportable pursuant to the following criteria:

10 CFR 50.73(a)(2)(i)(B) Any operation or condition which was prohibited by the plant's Technical Specifications

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 cause, failure, or sequence of events.

A review of the ANO corrective action program and LERs. No similar events were identified during the previous three years.

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