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Exelon Nuclear

10 CFR 50.73

April 16, 2010
BW100043

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

Braidwood Station, Unit 2
Facility Operating License No. NPF-77
NRC Docket No. STN 50-457

Subject: Licensee Event Report 2010-001-00 – Essential Service Water Pump Inoperability Due to Braided Hose Leakage

The enclosed Licensee Event Report (LER) is being submitted in accordance with 10 CFR 50.73, "Licensee event report system," paragraph (a)(2)(i)(B), as a condition prohibited by technical specifications. This condition was identified on February 15, 2010, and involved leakage on a braided hose, which provides seal cooling to the 2A essential service water pump inboard seal.

10 CFR 50.73(a) requires an LER to be submitted within 60 days following discovery of the event. Therefore, this report is being submitted by April 16, 2010.

There are no regulatory commitments contained in this letter. Should you have any questions concerning this submittal, please contact Mr. Ronald Gaston, Regulatory Assurance Manager, at (815) 417-2800.

Respectfully,

Amir Shahkarami
Site Vice President
Braidwood Station

Enclosure: LER 2010-001-00
cc: NRR Project Manager – Braidwood Station
Illinois Emergency Management Agency – Division of Nuclear Safety
US NRC Regional Administrator, Region III
US NRC Senior Resident Inspector (Braidwood Station)

NRC FORM 366 (9-2007) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 08/31/2010

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 Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@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)

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4. TITLE

Essential Service Water Pump 2A Braided Hose Failure Resulted in a Condition Prohibited by Technical Specifications

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	N/A
02	15	2010	2010	001	00	04	16	2010	FACILITY NAME: N/A	DOCKET NUMBER: N/A

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)
- ☐ 20.2201(d)
- ☐ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☐ 50.73(a)(2)(i)(A)
- ☒ 50.73(a)(2)(i)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(A)
- ☐ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☐ 50.73(a)(2)(iv)(A)
- ☐ 50.73(a)(2)(v)(A)
- ☐ 50.73(a)(2)(v)(B)
- ☐ 50.73(a)(2)(v)(C)
- ☐ 50.73(a)(2)(v)(D)
- ☐ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☐ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- ☐ OTHER

Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER *(Include Area Code)*
Ronald Gaston, Regulatory Assurance Manager	(815) 417-2800

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	BI	Flexible Hose	F155	N	NA	NA	NA	NA	NA

14. SUPPLEMENTAL REPORT EXPECTED

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

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR
NA	NA	NA

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

On January 29, 2010, an equipment operator identified a leak on the 2A essential service water (SX) Pump. The leak was from a braided flexible metal hose that provides cooling/flushing water from the casing of the pump to the inboard pump seal. The size of the leak was determined not to prevent the 2A SX pump from delivering required flow to safety related loads, and was not affecting any components on the 2A SX pump or any other equipment in the area. Initial inspection indicated the leak was from the connection of the braided hose and was not pressure boundary leakage. Therefore, the SX Technical Specifications (TS) Condition for Operation (LCO) Condition A was not entered, and it was decided to replace the flexible hose during an upcoming work window.

Following replacement, the hose was sent to a vendor for failure analysis. On February 15, 2010, the station was notified that the failure analysis identified a pinhole leak approximately seven inches from the end of the hose. The leak was caused by vibration induced wear at the contact points of the braided wire jacket against the metal hose surface. The leak was classified as ASME Section III Class 3 pressure boundary leakage. The 2A SX pump was inoperable due to the ASME component failure. Therefore, TS 3.7.8 Condition A should have been entered. Corrective actions include installation of a cushioning bronze inner braid on the SX seal water flexible hoses; implementing a 6-year replacement preventive maintenance program (PM) for the SX seal water flexible hoses; and providing operator training related to ASME code applicability and system design and on short term LCO actions requiring assistance from other groups.

There were no actual safety consequences impacting plant or public safety as a result of the event. The event is being reported pursuant to 50.73(a)(2)(i)(B), as a condition prohibited by TS 3.7.8 Condition C.

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NARRATIVE

Background:

A. Plant Operating Conditions Before The Event:

Event Date: February 15, 2010 Event Time: 1443 CST

Unit: 2 MODE: 1 Reactor Power: 100 percent

Unit 2 Essential Service Water: Normal operating temperature and pressure

B. Description of Event:

On January 29, 2010, an equipment operator observed leakage from a braided hose that runs from the casing of the 2A SX pump to its inboard seal. The hose provides cooling and flushing functions to the pump seal. The initial report indicated the leak rate was sixty drops per minute from a fitting. The size of the leak did not prevent the 2A SX pump from delivering required flow to safety related loads. Additionally, the leak was not affecting any components on the 2A Essential Service Water (SX) [BI] pump or any other equipment in the area. Because the initial inspection indicated the leak was from a fitting, it was not considered pressure boundary leakage, and the pump was determined to be operable in the prompt operability determination. Technical Specifications (TS) Limiting Condition Operation 3.7.8 Condition A for the 2A SX pump was not entered.

On February 2, 2010, the 2A SX pump was run so that Plant and Design Engineering could perform an inspection of the flexible hose while the pump was running and while it was idle. Zero leakage was observed during this inspection. However, it was conservatively decided to proceed with replacement of the hose during a 2A SX strainer work window that commenced later on February 2, 2010. It was also decided that the flexible hose would be submitted for failure analysis after removal.

The flexible hose was replaced during the work window and sent to a vendor for failure analysis. The work window was exited on February 4, 2010, and the 2A SX train was declared operable.

On February 15, 2010, the station was provided the failure analysis results, which concluded the hose contained a pinhole leak approximately seven inches from one end of the hose. The leak was caused by external wear from rubbing contact with the braided wire jacket. Similar non-through wall wear was observed at several other locations along the length of the hose. The hose's application makes it susceptible to vibration-induced movements that promote wear.

The failure analysis results represent pressure boundary leakage of an ASME Section III Class 3 code line. As such, the pump should have been declared inoperable at the time the leak was identified (January 29, 2010) until the pump was restored to operable status following the 2A SX strainer work window (February 2, 2010). The amount of time would have exceeded the allowed outage time of 72 hours and resulted in a condition not allowed by TS. The event is being reported pursuant to 50.73(a)(2)(i)(B), as a condition prohibited by TS 3.7.8 Condition C. The pressure boundary leakage was discovered upon receipt of the failure analysis results (February 15, 2010).

No additional structures, systems, or components were inoperable at the start of this event that contributed to the event.

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NARRATIVE

C. **Cause of Event**

The failure analysis concluded the following: Pressure testing indicated the flex hose contained a pinhole leak approximately seven inches from one end of the hose. The leak was caused by external wear from rubbing contact with the braided wire jacket. Similar non-through wall wear was observed at several other locations along the length of the hose. The hose's application makes it susceptible to vibration-induced movements that promote wear.

D. **Safety Consequences:**

The line provides seal flushing and cooling functions. The required flow through the line must circulate around the primary ring (seal face) through a mating ring (seat) at no less than 0.4 gallons per minute (gpm) in order to remove heat generated, or failure may occur. Based on a review of the failure analysis report and engineering judgment, the flex hose would have supported operation of the pump. The through-wall flaw was the result of fretting of the inner bellows by the outside stainless steel braiding and was localized. Based on the localized nature of the degradation mechanism and the robustness of the flexible hose design when compared to actual operating conditions, the degraded condition would not have resulted in a catastrophic failure of the hose. As a result, the increase in plant risk was minimal.

There were no actual safety consequences to this condition.

E. **Corrective Actions:**

The corrective actions include:

- The braided hose has been replaced.
- A cushioning bronze inner braid on the SX seal water flexible hoses will be installed (i.e., flexible hose that is supplied with a bronze braid between an inner hose and an outer stainless steel braided jacket).
- A 6-year replacement preventive maintenance program (PM) will be implemented for the SX seal water flexible hoses. The 6-year frequency was chosen based upon the time from installation to the experienced failure (approximately eight years).
- Operator training will be provided, related to ASME code applicability and system design and on short term LCO actions requiring assistance from other groups.

F. **Previous Occurrences:**

There have been no previous, similar events identified at the Braidwood Station.

G. **Component Failure Data:**

Manufacturer	Nomenclature	Model	Mfg. Part Number
Senior Flexonics Inc.	Flexible Hose Assembly	J43350-6	½" x 42"-J43350-6