Exelon Generation Company, LLC
Braidwood Station
35100 South Route 53, Suite 84
Braceville, IL 60407-9619

www.exeloncorp.com

Exelon Nuclear

10 CFR 50.73

April 9, 2009
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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: Submittal of Supplemental Licensee Event Report Number 2008-001-01 – "2A Essential Service Water Train Inoperable due to Strainer Fouling from Bryozoa Deposition and Growth"

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 the plant Technical Specifications (TS). This LER is a supplement to LER 2008-001-00 which was submitted on December 8, 2008. This supplement contains updated information regarding the safety significance of the issue.

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

Respectfully,

Bryan Hanson
Site Vice President
Braidwood Station

Enclosure: LER Number 2008-001-01

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

2A Essential Service Water Train Inoperable due to Strainer Fouling from Bryozoa Deposition and Growth

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
									Braidwood Station, Unit 1	05000456
09	02	2008	2008	- 001 -	01	04	09	2009	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)*
David Gullott, 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
N/A	N/A	N/A	N/A	N/A	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 September 2, 2008, the 1A Essential Service Water (SX) pump discharge strainer differential pressure increased significantly during a pump surveillance. The 1A SX train was declared inoperable due to strainer fouling. On September 4, 2008, the 2A SX train was declared inoperable due to the inability to manually backwash the 2A SX strainer. Subsequent inspection identified the presence of live bryozoa in the Circulating Water (CW) forebays (i.e., SX pump suction source). Following cleaning of the forebays, on September 4, 2008, the 1A SX train was restored to operable status, and on September 6, 2008, the 2A SX train was restored to operable status.

On October 8, 2008, it was determined that the 2A SX train should have been considered inoperable at the same time the 1A SX train was declared inoperable, based on the 1A and 2A pumps sharing a common suction source. Since the 2A SX train was not returned to an operable status until September 6, 2008, the Limiting Condition for Operation 3.7.8, Condition A, 72 hour Completion Time was exceeded.

The causes of this event are: 1) the site organization did not understand the bryozoa life cycle and the bryozoa deposition and growth mechanism downstream of the CW forebay traveling screens, and 2) a lack of questioning attitude existed regarding the SX strainer design to address rapid fouling challenges. The corrective actions include: development and implementation of a lake macro-biological program; and establishment of a process for utilization of a Devil's Advocate in situations where key decisions are made for the performance of the safety related systems.

There were no actual safety consequences impacting plant or public safety as a result of this event. This event is being reported pursuant to 10 CFR 50.73(a)(2)(i)(B).

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NARRATIVE

A. Plant Operating Conditions Before The Event:

Event Date: September 2, 2008 Event Time: 08:45

Unit: 2 MODE: 1 Reactor Power: 99.9 percent

Unit 2 Reactor Coolant System (RCS) [AB] Temperature: 581 degrees F, Pressure: 2236 psig

B. Description of Event:

There were no structures, systems or components inoperable at the beginning of the event that contributed to the severity of the event.

On September 2, 2008, the 1A Essential Service Water (SX) [BI] pump discharge strainer differential pressure increased significantly and pump flow decreased during performance of the American Society of Mechanical Engineers (ASME) pump surveillance. During this surveillance, the auto backwash function of the SX strainers was secured per procedure. Operations suspended the performance of the ASME surveillance and restored strainer backwash function and the SX system flow to normal conditions. The 1A SX train was declared inoperable at 08:45 hours and Condition A of Limiting Condition for Operation (LCO) 3.7.8 was entered. Condition A requires the inoperable unit-specific SX train to be restored to operable status within 72 hours. Subsequent inspection identified the presence of live bryozoa in the Circulating Water (CW) [KE] forebays (i.e., SX pump suction source) which caused the fouling of the 1A SX pump strainer. Following cleaning of the 1B CW forebay and aligning the 1A SX pump suction to this forebay, the 1A SX train was declared operable and LCO 3.7.8 Condition A was exited on September 4, 2008, at 23:34 hours.

On September 4, 2008, at 05:36 hours, the 2A SX train was declared inoperable due to the inability to manually backwash the 2A SX pump strainer with high strainer differential pressure. Condition A of LCO 3.7.8 was entered for the 2A SX train. Following cleaning of the 1A CW forebay and restoration of the 2A SX strainer power supply, the 2A SX train was declared operable on September 6, 2008 at 03:38 hours and Condition A was exited.

Braidwood's SX system is designed such that the 1A SX and the 2A SX trains take suction from the lake via the Unit 1 CW forebays, and the 1B SX and the 2B SX trains take suction from the lake via the Unit 2 CW forebays.

On October 8, 2008, during a past operability review, it was determined that the 2A SX train should have been considered inoperable at the same time the 1A SX train was declared inoperable. This conclusion was based on the 1A and 2A SX pumps sharing a common suction source (i.e, Unit 1 CW forebays). Therefore, the 2A SX train was considered inoperable as of 08:45 hours on September 2, 2008. Since the 2A SX train was not returned to an operable status until 03:38 hours on September 6, 2008, the 72 hour Completion Time of LCO 3.7.8 Condition A was exceeded.

Therefore, this event is reportable under 10 CFR 50.73(a)(2)(i)(B), any operation or condition which was prohibited by the Technical Specifications.

C. Cause of Event

Following the 1A SX strainer fouling events on September 2, 2008, a sample of the fouling material was collected. The sample confirmed the presence of live bryozoa in the CW forebays. Bryozoans are small, aquatic animals that grow on submerged surfaces and can grow and branch and form mats that are loosely attached to surfaces and itself. As a result, both units' CW forebays were inspected and cleaned. Additionally, a temporary modification was completed adding safety related essential power [EB] to the SX strainer backwash system.

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The CW forebay inspection identified live bryozoa colonies in all six CW forebays (1A/B/C and 2A/B/C). The inspection results indicated that significant bryozoa mass existed in the Unit 1 forebays immediately upstream of the intakes that supply the 1A and 2A SX pumps. The bryozoa mass in the Unit 2 forebays immediately upstream of the intakes that supply the 1B and 2B SX pumps was approximately 30% less than the Unit 1 side.

Live bryozoa was discovered previously in the CW forebays in October 2005 and in September 2002. During the previous events, all forebays indicated the presence of bryozoan colonies to varying degrees. In those instances, however, the amount of bryozoa present did not result in failure of flow rate surveillances, or a declaration of system inoperability. The corrective actions following the 2005 bryozoa event included mechanical cleaning of the forebays, completion of a lake bryozoa study for control and mitigation of bryozoa, development of an adverse condition monitoring plan, and additional forebay inspections prior to and after the summer months.

Following the events of September 2008, a root cause evaluation was performed. This evaluation determined two causes of the 2008 event:

1. The site organization did not understand the bryozoa life cycle and the bryozoa deposition and growth mechanism downstream of the CW forebay traveling screens. The previously established bryozoa monitoring plans did not inspect for byrozoa during peak growth periods, and sampling skids installed on the bar racks just outside the forebays were not indicative of the bryozoa growth and deposition near the SX pump intakes.
2. A lack of questioning attitude existed regarding the SX strainer design's ability to address rapid fouling challenges. Previous reviews for re-affirming the SX strainer design basis did not fully consider what could occur to cause rapid strainer fouling events nor how these events could negate the compensatory actions that the station could take to restore the strainers.

D. Safety Consequences:

There were no actual safety consequences as a result of this event. Both units remained at 100% power and non-essential power [EA] was available to support the SX strainer backwash function.

The impacts of bryozoa on safety related heat exchangers were reviewed using current and five year historical data. There has been no reporting of live bryozoa in safety related plant systems. Periodic maintenance inspections of the safety related heat exchangers confirm that current chemical treatment, flushing, and operating practices are sufficient to maintain equipment in a condition that meets the requirements of NRC Generic Letter (GL) 89-13, "Service Water System Problems Affecting Safety-Related Equipment," and ASME Code Inservice Inspection (ISI) standards.

The evaluation of the effects of the bryozoa fouling indicates that both units and trains of SX strainers were capable of mitigating the effects of bryozoa into the SX system when non-essential power was maintained to the SX strainer backwash components.

Further analysis, performed to support the Significance Determination Process, determined the SX system was capable of performing its safety function. Therefore, this event did not result in a safety system functional failure.

The risk evaluation showed that the incremental increase in core damage probability was less than 1E-06 and therefore considered to be of very low risk significance. This risk evaluation is being reviewed by the NRC.

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NARRATIVE

E. Corrective Actions:

Corrective actions to prevent recurrence include:

1. Development and implementation of a lake macro-biological program, to include; 1) monitoring, 2) inspection, and 3) mitigation. This will provide the strategies and bases for monitoring of bryozoa and other biological challenges in the lake and the forebays, inspections of forebays, and forebay cleaning threshold ensuring that the GL 89-13 program requirements are met.
2. Establishment of a process for utilization of a Devil's Advocate in situations where key decisions are made for the performance of the safety related systems.

Additional Corrective Actions include:

1. Installation of a mechanical debris removal system such as a sparger to provide flushing capability to prevent accumulation of bryozoa (and other materials) downstream of the traveling screens during summer months.
2. Evaluate use of a non-intrusive forebay monitoring system for monitoring bryozoa growth and deposition in the forebays.
3. Develop actions to improve the design of the SX pump discharge strainers by providing the SX pump discharge strainers' power supply, alarms and controls with a permanent safety related power source.
4. Development of a case study of this event, and provide in continuing training for appropriate Braidwood Station personnel.

F. Previous Occurrences:

There have been no similar Licensee Event Report events at Braidwood Station in the last three years.

Two other events occurred at Braidwood Station relating to SX strainer differential pressure and bryozoa growth in the circulating water forebays:

- September 2002: During forebay inspections, silt buildup and bryozoa growth was found.
- October 2005: Bryozoan growth discovered following SX strainer differential pressure alarms. An equipment apparent cause evaluation was performed. Corrective actions included mechanical cleaning of the forebays, completion of a lake bryozoa study for control and mitigation of bryozoa, development of an adverse condition monitoring plan, and additional forebay inspections prior to and after the summer months.

G. Component Failure Data:

Manufacturer	Nomenclature	Model	Mfg. Part Number
N/A	N/A	N/A	N/A