



Exelon Generation®

Clinton Power Station  
8401 Power Road  
Clinton, IL 61727

U-604297  
July 15, 2016

10CFR50.73  
SRRS 5A.108

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

Clinton Power Station, Unit 1  
Facility Operating License No. NPF-62  
NRC Docket No. 50-461

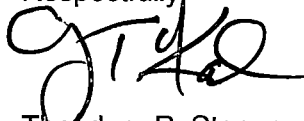
Subject: Licensee Event Report 2016-007-00

Enclosed is Licensee Event Report (LER) 2016-007-00: Main Steam Line Flexible Hose Intergranular Stress Corrosion Cracking Identified During Refueling Outage. This report is being submitted in accordance with the requirements of 10 CFR 50.73.

There are no regulatory commitments contained in this report.

Should you have any questions concerning this report, please contact Mr. Dale Shelton, Regulatory Assurance Manager, at (217) 937-2800.

Respectfully

 FOR TED STONER

Theodore R. Stoner  
Site Vice President  
Clinton Power Station

KP/cac

Attachment: Licensee Event Report 2016-007-00

cc:

Regional Administrator— NRC Region III  
NRC Senior Resident Inspector - Clinton Power Station  
Office of Nuclear Facility Safety — Illinois Emergency Management Agency

JE 22  
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**LICENSEE EVENT REPORT (LER)**

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

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 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.

<b>1. FACILITY NAME</b> Clinton Power Station, Unit 1	<b>2. DOCKET NUMBER</b> 05000461	<b>3. PAGE</b> 1 OF 4
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**4. TITLE**  
Main Steam Line Flexible Hose Intergranular Stress Corrosion Cracking Identified During Refueling Outage

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
05	17	2016	2016	007	00	07	15	2016		05000
									FACILITY NAME	DOCKET NUMBER
										05000

<b>9. OPERATING MODE</b>	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)</b>			
4	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input checked="" type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)
10. POWER LEVEL  000	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> 73.77(a)(1)
	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	<input type="checkbox"/> 73.77(a)(2)(i)
	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> 73.77(a)(2)(ii)
	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> OTHER	Specify in Abstract below or in NRC Form 366A	

**12. LICENSEE CONTACT FOR THIS LER**

LICENSEE CONTACT Dale A. Shelton, Regulatory Assurance Manager	TELEPHONE NUMBER (Include Area Code) 217-937-2800
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**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
X	SB	PSX	M270	Y					

<b>14. SUPPLEMENTAL REPORT EXPECTED</b> <input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	<b>15. EXPECTED SUBMISSION DATE</b>	MONTH	DAY	YEAR

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

On May 17, 2016 with the plant in Mode 4 during Refueling Outage C1R16 personnel entered the drywell to perform a system walkdown. At 0945 CDT water was identified leaking from flexible hoses located at the inner elbows of main steam line (MSL) B and MSL C. It was determined that the leakage was from the flexible hoses associated with the MSL flow instrumentation. The degraded flexible hose on MSL B was previously replaced in 2008 and on MSL C in 2007. An analysis determined the failure mechanism of the degraded flexible hoses as Intergranular Stress Corrosion Cracking (IGSCC). Main Steam Line C flexible hose had previously failed in 2007 due to IGSCC. Corrective actions taken for that event did not prevent a recurrence of the condition identified during C1R16. The leaking flexible main steam line hoses and the remaining flexible hoses on the MSLs B and C were replaced during C1R16. The remaining inner elbow flexible hoses on MSLs A and D have been scheduled for replacement during the next refueling outage C1R17. This condition is reportable under 10 CFR 50.73(a)(2)(ii)(A), as a condition that resulted in the condition of the nuclear power plant, including its principal safety barriers being seriously degraded.



**LICENSEE EVENT REPORT (LER)  
CONTINUATION SHEET**

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**NARRATIVE**

**PLANT AND SYSTEM IDENTIFICATION**

General Electric—Boiling Water Reactor, 3473 Megawatts Thermal Rated Core Power Energy Industry Identification System (EIS) codes are identified in the text as [XX]

**EVENT IDENTIFICATION**

Main Steam Line Flexible Hose Intergranular Stress Corrosion Cracking Identified During Refueling Outage

**A. Plant Operating Conditions before the Event**

Unit: 1                      Event Date: May 17, 2016                      Event Time: 0945  
 Mode: 4                      Mode Name: Cold Shutdown                      Reactor Power: 0 percent

**B. DESCRIPTION OF EVENT**

On May 17, 2016 at 0945 while the plant was in Mode 4 (Cold Shutdown) during refueling outage C1R16, it was discovered that water was leaking from two separate flexible hoses connecting the main steam line (MSL) to flow instrumentation. Steam flow during power operations is measured in each MSL using instrument taps off the inside and outside of the respective piping elbow. Pressure sensed in each of the lines is used to derive the steam flow. Flexible hose 1B21-D372C - located at the inner elbow on MSL 'B' had water leaking slowly in a thin, steady stream. The leak originated from the collar on the end of the hose closest to MSL 'B'. No mechanical damage was noted on the flexible hose or attached insulation. The vacuum port protective jacket was in place. Flexible hose 1B21-D372E - located at the inner elbow on MSL 'C' had water dripping out slowly, less than 5 dpm. The leak was coming from the area of the vacuum port near the top of the hose, going down the side, and dripping off the bottom. A failure analysis of the flexible hose failures identified the failure mechanism as Intergranular Stress Corrosion Cracking (IGSCC).

Both leaking flexible hoses 1B21-D372C and 1B21-D372E were replaced during the refueling outage and their respective high side flexible connections were also replaced. No additional leaks were found during an inspection of other flexible hoses connected to MSLs and the reactor recirculation system.

An examination of monitored drywell points prior to plant shutdown for C1R16 showed no change in temperature, pressure or airborne radiation levels.

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**NARRATIVE**

**C. CAUSE OF EVENT**

IGSCC resulted in the failed flexible hose discovered during the C1R16 walkdown. The root cause evaluation for this event determined that the corrective actions to prevent recurrence of the condition identified June 18, 2007 (LER 2007-003) failed to eliminate or significantly reduce below threshold any of the three factors required for IGSCC to exist (susceptible material, tensile stresses, and aggressive environment).

**D. SAFETY ANALYSIS**

There were no safety consequences associated with this condition. This event is reportable under the provisions of 10 CFR 50.73(a)(2)(ii)(A) for the condition of the nuclear power plant including its principal safety barriers being seriously degraded. A plant shutdown was not required since the plant was in Mode 4 during refueling outage C1R16. The plant subsequently transitioned to Mode 5. Discovery of the reportable condition was the result of a planned walkdown to inspect the condition of MSL flexible hoses. Systems necessary to maintain the plant per Technical Specification requirements during the performance of refueling outage activities in Mode 5 were available to perform their safety function.

This event report does not identify any safety system functional failures.

**E. CORRECTIVE ACTIONS**

The leaking flexible main steam line hoses and the remaining flexible hoses on the MSLs B and C were replaced during C1R16. The remaining inner elbow flexible hoses on MSLs A and D have been scheduled for replacement during the next refueling outage C1R17. A design modification is planned to eliminate or significantly reduce at least one of the three factors required for IGSCC (susceptible material, tensile stress, or corrosive environment) to below the threshold where IGSCC can be initiated.

**F. PREVIOUS SIMILAR OCCURENCES**

LER 2007-003-00: IGSCC Causes Pressure Boundary Leak and Reactor Shutdown

On June 18, 2007, Operations performed a plant shutdown at 1241 hours to assess indications of a drywell steam leak and repair the leak. On June 19 at 0635, Maintenance personnel entered the drywell and found pressure boundary leakage on a one-inch diameter ASME Section III Class II stainless steel braided flexible hose assembly on the 'C' Main Steam Line flow elbow low-pressure instrumentation tap. Operators entered the actions of Technical Specification 3.4.5, which required a plant shutdown due to reactor coolant pressure boundary leakage. The cause of this event was IGSCC. Flexible hose assemblies installed in IGSCC susceptible locations were replaced. Susceptible flexible hose assemblies that were not currently in service were cut out and the lines were capped. Preventive maintenance was established to periodically replace susceptible flexible hose assemblies installed in IGSCC susceptible locations.

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**NARRATIVE**

**G. COMPONENT FAILURE DATA**

Manufacturer	Nomenclature
Metal Bellows Corp.	1-inch ASME III Class II, Flexible Braided High Pressure Stainless Steel Hose
Senior Flexonics, Inc.	1-inch ASME III Class II, Flexible Braided High Pressure Stainless Steel Hose