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March 28, 2011

10 CFR 50.73

Byron Ltr 2011-0056  
File 1.10.0101

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

Byron Station, Unit 2  
Facility Operating License No. NPF-66  
NRC Docket No. STN 50-455

Subject: Licensee Event Report 2011-001-00, "Unit 2 Emergency Diesel Generator Inoperable for Longer Than Allowed by Technical Specifications Due to Inadequate Work Instructions"

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. The LER involves a Unit 2 Emergency Diesel Generator that was unknowingly inoperable for approximately six months due to loose bolting on its upper lubricating oil cooler.

There are no regulatory commitments contained in this letter. Should you have any questions concerning this submittal, please contact Mr. David Gudger, Regulatory Assurance Manager, at (815) 406-2800.

Respectfully,



Timothy J. Tulon  
Site Vice President  
Byron Station

Enclosure: LER Number 455-2011-001-00

# LICENSEE EVENT REPORT (LER)

(See reverse 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 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.

<b>1. FACILITY NAME</b> Byron Station, Unit 2	<b>2. DOCKET NUMBER</b> 05000455	<b>3. PAGE</b> 1 OF 4
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**4. TITLE**  
Unit 2 Emergency Diesel Generator Inoperable for Longer than Allowed by Technical Specifications Due to Inadequate Work

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
11	17	2010	2011	- 001	- 00	03	28	2011	N/A	N/A
									FACILITY NAME	DOCKET NUMBER
									N/A	N/A

<b>9. OPERATING MODE</b>  1	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §:</b> (Check all that apply)			
<b>10. POWER LEVEL</b>  100	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)
	<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)(C)	<input type="checkbox"/> OTHER
	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

**12. LICENSEE CONTACT FOR THIS LER**

FACILITY NAME David Gudger, Regulatory Assurance Manager	TELEPHONE NUMBER (include Area Code) (815) 406-2800
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**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
D	EK	CLR	C634	Yes					

<b>14. SUPPLEMENTAL REPORT EXPECTED</b> <input checked="" type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input type="checkbox"/> NO	<b>15. EXPECTED SUBMISSION DATE</b>	MONTH	DAY	YEAR
		05	20	2011

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

On November 17, 2010, during a surveillance run, the Unit 2 "A" (2A) Emergency Diesel Generator (DG) was operating when the Equipment Operator (EO), assigned to monitor the 2A DG, identified a significant lubricating oil leak from the upper oil cooler. The EO tripped the DG by depressing the emergency stop pushbutton. The 2A DG was declared inoperable and Technical Specifications 3.8.1, "AC Sources – Operating" Condition B was entered. The oil leak source was determined to be coming from the upper lubricating oil cooler at the bolted flange connection between the cooler's shell and the stationary channel head. The as-found bolt torque values were found to be significantly less than the expected value of 110 foot pounds. It was determined the bolt loosening was caused by the torquing of another flange that was misaligned during 2A DG maintenance in January 2010. It was also identified that the Electric Power Research Institute (EPRI) provided recommendations for assembly of misaligned joints to prevent short term relaxation. This recommendation was not incorporated into the appropriate maintenance procedure for work on DG oil coolers. The cause was determined to be a lack of a formal process to ensure EPRI documents are systematically reviewed for good practices and then incorporated into maintenance procedures. Corrective actions include revising the maintenance procedure for assembly of bolted connections to incorporate the EPRI recommendations and revising the Operating Experience program to include EPRI documents. The 2A DG was restored to operable status on November 22, 2010.

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**NARRATIVE**

NRC FORM 366 (10-2010)

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

Unit 2 was in Mode 1 – Power Operations at 100% nominal power.

Reactor Coolant System (RC) [AB]: Normal operating temperature and pressure.

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

**B. Description of Event**

On November 17, 2010, during a monthly surveillance run, the Unit 2 "A" (2A) Emergency Onsite Power Supply Diesel Generator (DG) [EK] was operating at full load when the Equipment Operator (EO), assigned to monitor the 2A DG, identified a significant lubricating oil leak from the upper oil cooler. The Main Control Room was immediately notified and the Unit operator began unloading the DG. The EO, at the 2A DG, then tripped the DG by depressing the emergency stop pushbutton. The 2A DG was declared inoperable and Technical Specifications 3.8.1, "AC Sources – Operating" Condition B was entered for one required DG inoperable. Troubleshooting and repair efforts were initiated.

The oil leak source was determined to be coming from the upper lubricating oil cooler at the bolted flange connection between the cooler's shell and the stationary channel head. The as-found bolted torque values were found to be significantly less than the expected value of 110 foot pounds. The loose bolts, and the resulting reduction in clamping force, allowed the gasket to extrude, which caused the oil leak. It was also determined that contributing to the cause of the bolt loosening on the upper oil cooler flange was misalignment between the outlet nozzle flange and lower oil cooler. The aligning and tightening of this lower flange after the upper oil cooler flange was torqued caused the upper oil cooler flange, bolting, and gasket to re-align to a more relaxed neutral position; resulting in the previously torqued bolts to become loose.

The upper oil cooler flange and the outlet nozzle flange had been disassembled during a previous 2A DG work window on January 17, 2010, to repair a leaking tube-to-tube sheet joint. After repairs were completed, a new gasket material was installed and the flange re-assembled. The work instructions provided maintenance personnel with direction to torque each separate mechanical joint to the proper torque value. However, these instructions were not consistent with an Electric Power Research Institute (EPRI) recommendation, for critical and problem joints, to re-torque after 24 hours to accommodate any unusual high short term relaxation. In addition, the gasket material manufacturer made a similar recommendation.

No leaks were identified during the post maintenance test run of the 2A DG, nor were there leaks observed during subsequent monthly surveillance runs prior to the November 17, 2010, failure. The lower torque combined with the normal 2A DG thermal cycles and vibration, as well as some expected gasket set over time, eventually resulted in the gasket extruding and subsequently leaking during the November 17, 2010, run. Total run time on the 2A DG from work completion after the January 17, 2010, work until the leak occurred on November 17, 2010, was approximately 64 hours.

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An evaluation was initiated to assess the 2A DG TS operability status from January 17, 2010, to November 17, 2010. Based on the results of this evaluation, on January 25, 2011, Exelon Generation Company, LLC (EGC) concluded that on May 19, 2010, the 2A DG would not have been able to fulfill its 24 hour mission time and therefore was unknowingly inoperable since this date until November 17, 2010. TS 3.8.1, Condition B requires an inoperable DG to be restored to operable status within 14 days, otherwise Condition G requires the Unit to be in Mode 3 within 6 hours and Mode 5 within 36 hours. Consequently, the condition of Unit 2 not in compliance with Condition G on June 2, 2010, is a condition prohibited by TS and reportable to the NRC in accordance with 10 CFR 50.73 (a)(2)(i)(B).

In addition, during the time period the 2A DG was unknowingly inoperable, the 2B DG was also inoperable due to emergent conditions or planned work activities. These situations will be reviewed to determine if other reporting requirements apply and will be reported in a supplement to this report.

The 2A DG was repaired and returned to operable status on November 22, 2010. An extent of condition check of lubricating oil coolers bolted connections found no other loose bolting.

**C. Cause/s of the Event**

The cause was determined to be an inadequate work instructions provided for the January 17, 2010, 2A DG work activities in that it did not contain sufficient directions to re-torque the bolted connections after initial torquing as recommended by EPRI and the gasket manufacturer. This was caused by a lack of a formal process to ensure EPRI documents are systematically reviewed for good practices and then incorporated into maintenance procedures.

**D. Safety Significance**

There were no actual safety consequences as a result of this condition. Safety bus 241 is normally supplied by off site power via its System Auxiliary Transformer (SAT) 242-1 and was available throughout the time frame that the 2A DG was unknowingly inoperable. Safety bus 242 was available and capable of being powered by its offsite power source and would have supplied power to B train components to safely shutdown the plant as designed.

The DGs are designed to provide emergency power to the safety buses in the event of a Loss-Of-Offsite-Power (LOOP). Had a LOOP occurred, the 2A DG would potentially not have run for the 24 hour mission time. The Unit 2 safety bus 241 would have become de-energized. Operating procedure would be utilized to energize bus 241 from Unit 1 safety bus 141. This source of power was available during this time frame.

In the event of a Station Blackout, either one of the two emergency DG for each unit serves as an alternate a-c power source for the opposite unit. The alternate a-c power source is available within 10 minutes of the onset of the Station Blackout event and has sufficient capacity and capability to operate equipment necessary to bring and maintain the station in a safe shutdown condition. Equipment required for Station Blackout is capable of being powered from a single remaining DG. The capability for providing power to the blacked-out unit is possible with manual operation of cross-tie switchgear breakers from the Main Control Room.

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**NARRATIVE**

A probability risk assessment performed for this condition concluded it to be of low to moderate significance.

The safety significance of the instances when the 2B DG was also inoperable will be reported in a supplement to this report.

**E. Corrective Actions**

The maintenance procedure governing assembly of bolted connections has been revised to address the assembly of equipment with multiple joints.

The model work orders for DG oil coolers assembly will be revised to require final torque checks after assembly and to include a requirement to ensure torque verification is performed within three months.

The maintenance procedure for assembly of bolted connections will be revised to incorporate EPRI recommendations.

The operating experience review process has been revised to include EPRI documents to ensure good practices are incorporated into EGC's procedures.

Training will be conducted for appropriate maintenance personnel concerning the assembly of multiple joints configurations.

**F. Previous Occurrences**

Several DG oil cooler flange leaks have been documented in the Corrective Action Program over the past 10 years. The leaks were minor in nature and did not result in the DG being declared inoperable. The repair typically involved re-torquing the flange bolts. No investigations were conducted into determining the cause involving the need to re-torque bolts.