



Byron Generating Station

4450 North German Church Rd  
Byron, IL 61010-9794

[www.exeloncorp.com](http://www.exeloncorp.com)

August 29, 2018

LTR: BYRON 2018-0086  
File: 1.10.0101 (1D.101)  
2.07.0100 (5A.108)

United States Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555-0001

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

Subject: Licensee Event Report (LER) No. 455-2018-001-00, Byron Station Unit 2  
Automatic Safety System Actuation following a trip of a Station Auxiliary  
Transformer and subsequent Loss of Offsite Power.

Enclosed is Byron Station Licensee Event Report (LER) No. 455-2018-001-00 regarding automatic actuation of the Emergency Diesel Generators and the Auxiliary Feedwater Pumps in response to a Station Auxiliary Transformer trip and resulting Loss of Offsite Power on Byron Unit 2. This condition is being submitted in accordance with 10 CFR 50.73, "Licensee Event Report System."

There are no regulatory commitments in this report.

Should you have any questions concerning this submittal, please contact Mr. Douglas Spitzer, Regulatory Assurance Manager, at (815) 406-2800.

Respectfully,

A handwritten signature in black ink, appearing to read "Mark E. Kanavos".

Mark E. Kanavos  
Site Vice President  
Byron Generating Station

MEK/GC/rm

Enclosure: LER 455-2018-001-00

cc: Regional Administrator – NRC Region III  
NRC Senior Resident Inspector – Byron Generating Station



**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/>)

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 Information Services Branch (T-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to [Infocollects.Resource@nrc.gov](mailto: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
---	-------------------------------------	--------------------------

**4. Title**  
Byron Unit 2 Automatic Safety System Actuation due to System Auxiliary Transformer 242-2 Failure and Subsequent Unit 2 Loss of Offsite Power (LOOP).

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
07	06	18	2018	- 001	- 00	08	29	18	N/A	N/A
									Facility Name	Docket Number
									N/A	N/A

<b>9. Operating Mode</b>	<b>11. This Report is Submitted Pursuant to the Requirements of 10 CFR §: (Check all that apply)</b>			
1	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input 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 checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)
<b>10. Power Level</b>	<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)
100	<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**

<b>Licensee Contact</b> Douglas Spitzer - Manager, Byron Regulatory Assurance	<b>Telephone Number (Include Area Code)</b> (815) 406-2800
--	---

**13. Complete One Line for each Component Failure Described in this Report**

Cause	System	Component	Manufacturer	Reportable to ICES	Cause	System	Component	Manufacturer	Reportable to ICES
x	EB	XFMR	ASEA	Y	N/A	N/A	N/A	N/A	N/A

<b>14. Supplemental Report Expected</b>	<b>15. Expected Submission Date</b>	Month	Day	Year
<input type="checkbox"/> Yes (If yes, complete 15. Expected Submission Date) <input checked="" type="checkbox"/> No		N/A	N/A	N/A

**Abstract** (Limit to 1400 spaces, i.e., approximately 14 single-spaced typewritten lines)

On July 6, 2018 at 1201 hours, with both units at Byron Station operating at approximately 100% power, Station Auxiliary Transformer (SAT) 242-1 and SAT 242-2 tripped due to a fault on SAT 242-2, causing a Loss of Offsite Power (LOOP) on Unit 2 and safety system actuation. SAT 242-2 experienced a fault and tripped on differential relay and sudden pressure relay actuation.

The root cause of the SAT 242-2 failure is indeterminate. The failure was the result of an aggregate contribution of multiple events, including operation with a sustained open phase in 2012 and a partial oil drain and refill to replace a degraded bushing in 2018, which degraded the dielectric qualities of the SAT 242-2 transformer insulation.

The corrective actions planned include installing a replacement transformer and implementing standard fleet guidance that directs the review and consideration of original equipment manufacturer (OEM) input for internal transformer maintenance and any associated oil drain and refill actions.

This condition is reportable as an LER in accordance with 10 CFR 50.73(a)(2)(iv)(A) for any event or condition that resulted in manual or automatic actuation of any of the systems listed in 10 CFR 50.73(a)(2)(iv)(B).



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

(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/>)

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 Information Services Branch (T-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to [Infocollects.Resource@nrc.gov](mailto: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.

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Byron Station – Unit 2	05000455	2018	- 001	- 00

**NARRATIVE**

**A. Plant Condition Prior to Event:**

Event Date: July 6, 2018

Unit: 2 Mode: 1 Reactor Power: 100 percent

Unit 2 Reactor Coolant System (RCS) [AB]: Normal operating temperature and pressure

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

**B. Description of Event:**

On July 6, 2018 at 1201 hours, with both units at Byron Station operating at approximately 100% power, Station Auxiliary Transformer (SAT) 242-1 and SAT 242-2 tripped due to a fault on SAT 242-2, causing a Loss of Offsite Power (LOOP) on Unit 2 and Safety System Actuation. SAT 242-2 experienced a fault and tripped on differential relay and sudden pressure relay actuation. A significant amount of oil was found leaking from the bottom of the "A" phase bushing and the bushing porcelain was found cracked. Additionally, the "C" phase bushing was leaking near the bottom of the bushing. Oil samples were collected from SAT 242-1 and SAT 242-2 and sent to a laboratory for a dissolved gas analysis. Results for SAT 242-1 were acceptable, while SAT 242-2 results were in the fault range. No alarms from the Serveron transformer monitoring system were received prior to or during the event. There were no switchyard operations, grid disturbances, or any weather events occurring at the time of the event.

The 2A and 2B Diesel Generators (DGs) started and sequenced loads onto the Unit 2 Emergency Safeguards Features (ESF) buses appropriately. All other buses normally powered from the SATs automatically transferred to the Unit Auxiliary Transformers per design. ESF Bus 241 and 242 Undervoltage Relays actuated to start the 2A and 2B DGs, and the 2A Auxiliary Feedwater Pump started on the 2A DG sequencer. The 2A AF Pump was secured on July 6, 2018 at 1243 hours. The 2A and 2B DGs were secured on July 6, 2018 at 1331 hours and 1401 hours respectively as Unit 2 ESF electrical loads were cross-tied to the reserve power supply (Unit 1 SATs) as allowed by Technical Specifications.

Operations declared the Unit 2 SATs inoperable per TS 3.8.1 and entered Condition A at 1201 hours. Immediate actions were taken by Operations following the SAT trips to restore the offsite power feed to Unit 2 from preferred offsite power supply via single SAT 242-1 operation. With this configuration, Technical Specification 3.8.1, Condition A was exited on July 8, 2018 at 1152 hours.

Because the internal failure sustained by SAT 242-2 resulted in a loss of offsite power and safety system actuation, this event resulted in an 8-hour Non-Emergency ENS notification per 10 CFR 50.72(b)3(iv)(A) due to the actuation of both Unit 2 DGs and the 2A Auxiliary Feedwater Pump. (Reference ENS 53491, 1536 EDT, "Transformer Failure Causes Loss of Offsite Power to Unit 2").

This condition is reportable as an LER in accordance with 10 CFR 50.73(a)(2)(iv)(A) for any event or condition that resulted in manual or automatic actuation of any of the systems listed in 10 CFR 50.73(a)(2)(iv)(B) due to the actuation of both Unit 2 DGs and the 2A Auxiliary Feedwater Pump.



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

(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/>)

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 Information Services Branch (T-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to [Infocollects.Resource@nrc.gov](mailto: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.

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Byron Station – Unit 2	05000455	2018	- 001	- 00

**NARRATIVE**

**C. Cause of Event:**

The root cause of the SAT 242-2 failure is indeterminate. The failure was the result of an aggregate contribution of multiple events, including operation with a sustained open phase in 2012 and a partial oil drain and refill to replace a degraded bushing in 2018, which degraded the dielectric qualities of the SAT 242-2 transformer insulation.

**D. Safety Consequences:**

This event is not considered an event or condition that could have prevented fulfillment of a safety function. This event consisted of the failure of one of two available Unit 2 SATs. Operations declared the Unit 2 SATs inoperable per TS 3.8.1 and entered Condition A. Operations met the Completion Time for TS 3.8.1 Required Action A.2 to restore required qualified circuits to operable status within 72 hours; therefore, Byron was always in compliance with Technical Specifications. There are no past operability considerations with respect to SAT 242-2. There were no actual safety consequences associated with the event since the Unit 2 DG performed as expected and since Operations met the required action and completion time to restore the offsite power system. This event was not a Safety System Functional Failure, as the SATs are not considered within the scope of the Safety System Performance Indicator. The design bases event for the offsite power system is a loss of offsite power. Therefore, there would have been no additional safety consequences if this event had occurred during the design basis event for this system.

**E. Corrective Actions:**

**Completed Corrective Actions**

Operations isolated SAT 242-2 per plant procedures and aligned power supplies for single SAT normal operation through SAT 242-1.

**Planned Corrective Actions**

Implement guidance within a fleet standard procedure that directs the review and consideration of OEM input for internal transformer maintenance and any associated oil drain and refill actions.

Purchase and install replacement transformer for SAT 242-2.

**F. Previous Occurrences:**

Byron Station Unit 1, Licensee Event Report (LER) 454-2014-003-00, "Byron Unit 1 Diesel Generator Actuation due to System Auxiliary Transformer 142-2 relay actuation and Loss of Offsite Power (LOOP)," dated May 14, 2014. This LER involved an actuation of the Emergency DGs following loss of offsite power when the unit 1 SATs tripped upon a differential relay actuation that initiated a trip and lockout of the Unit 1 SAT feed breakers.

Licensee Event Report (LER) 455-2012-001-00, "Unit 2 Loss of Normal Offsite Power and Reactor Trip and Unit 1 Loss of Normal Offsite Power Due to Failure of System Auxiliary Transformer Inverted Insulators," dated March 30, 2012. This LER involved an actuation of the Emergency DGs following loss of offsite power when switchyard porcelain insulators failed, resulting in an open phase non-faulted condition on one of the phases.

A review of these LERs concluded that these events are similar; however, the causes and corrective actions taken would not have been expected to prevent this event from occurring.



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

(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/>)

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 Information Services Branch (T-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to [Infocollects.Resource@nrc.gov](mailto: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.

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Byron Station – Unit 2	05000455	2018	- 001	- 00

**NARRATIVE**

**G. Component Failure Data:**

Manufacturer	Nomenclature	Model	Mfg. Part Number
ASEA	TRANSFORMER	TMY-45	S/N 6311-318