



Commonwealth Edison  
Byron Nuclear Station  
4450 North German Church Road  
Byron, Illinois 61010

August 12, 1992

Ltr: BYRON 92-0549

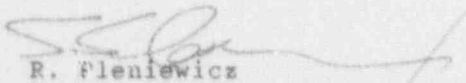
U. S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, D.C. 20555

Dear Sir:

The enclosed Licensee Event Report from Byron Generating Station is being transmitted to you in accordance with the requirements of 10CFR50.73(a)(2)(v).

This report is number 92-005; Docket No. 50-454.

Sincerely,

  
R. Fleniewicz  
Station Manager  
Byron Nuclear Power Station

RP/CW/mw

Enclosure: Licensee Event Report No. 92-005

cc: A. Bert Davis, NRC Region III Administrator  
W. Kropp, NRC Senior Resident Inspector  
INPO Record Center  
CECo Distribution List

170136 (1936/VS)

9208180033 920813  
PDR ALOCK 05000454  
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## LICENSEE EVENT REPORT (LER)

Form Rev 2.0

Facility Name (1) Byron, Unit 1										Docket Number (2) 0   5   0   0   0   4   5   4					Page (3) 1   of   0   5				
Title (4) Degraded Equipment Voltage Setpoints																			
Event Date (5)			LER Number (6)				Report Date (7)			Other Facilities Involved (8)									
Month	Day	Year	Year	Sequential Number	Revision Number	Month	Day	Year	Facility Name		Docket Number(s)								
0   7	2   4	9   2	9   2	0   0   5	0   0	0   8	1   3	9   2	Byron Unit 2		0   5   0   0   0   4   5   5								
OPERATING MODE (9)			THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)																
POWER LEVEL (10)			20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)										
0   9   8			20.405(a)(1)(i)		50.36(c)(1)		X 50.73(a)(2)(v)		73.71(c)										
			20.405(a)(1)(ii)		50.36(c)(2)		50.73(a)(2)(vii)		Other (Specify in Abstract below and in Text)										
			20.405(a)(1)(iii)		50.73(a)(2)(i)		50.73(a)(2)(viii)(A)												
			20.405(a)(1)(iv)		50.73(a)(2)(ii)		50.73(a)(2)(viii)(B)												
			20.405(a)(1)(v)		50.73(a)(2)(iii)		50.73(a)(2)(x)												
LICENSEE CONTACT FOR THIS LER (12)																			
Name R. Mancini, Technical Staff Engineer Ext. 2478										TELEPHONE NUMBER									
R. Wegner, Asst. Tech Staff Supervisor Ext. 2274										AREA CODE									
										8   1   5   2   1   3   4   -   5   4   4   1									
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																			
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS										
B				N															
SUPPLEMENTAL REPORT EXPECTED (14)																			
[Yes (If yes, complete EXPECTED SUBMISSION DATE)] X   NO										Expected Submission Date (15)	Month	Day	Year						

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

Byron Station was notified on July 24, 1992 by Corporate Engineering of the results of the degraded voltage setpoint study for ESF Buses 141, 142, 241, and 242. This study concluded that with the previous Technical Specification setpoint of 3804 VAC some safety related equipment may not have started or operated if ESF bus voltages were degraded to this level. On July 24, 1992, Corporate Engineering proposed a final degraded voltage setpoint of 3847 VAC with an allowable value of 3793.3 VAC.

The cause of the event was that the previous degraded voltage setpoint calculation did not evaluate all plant equipment on each safety related bus for the effect of the 4 KV bus degraded voltage setpoint.

Modifications have been scheduled to install tap changes and new degraded voltage relays.

This event is reportable pursuant to 10CFR50.73(a)(2)(v), any event or condition that alone could have prevented the fulfillment of the safety function of structures or systems that are needed to: a) Shutdown the reactor and maintain it in a safe shutdown condition, b) Remove residual heat, c) Control the release of radioactive material, or d) Mitigate the consequences of an accident.

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TEXT: Energy Industry Identification System (EIIIS) codes are identified in the text as [XX]

## A. PLANT CONDITIONS PRIOR TO EVENT:

Event Date/Time 07/24/92 / 1445Unit 1 MODE 1 - Power Operation Rx Power 98% RCS [AB] Temperature/Pressure Normal OperatingUnit 2 MODE 3 - Hot Standby Rx Power 0% RCS [AB] Temperature/Pressure 420°F/780 psig

## B. DESCRIPTION OF EVENT:

On July 24, 1992, Byron Station was notified by Nuclear Engineering Department (NED) on the results of the final degraded voltage setpoint study for the safety related buses. The degraded voltage setpoint is responsible for stripping the loads off the ESF bus and starting the diesel generator. The current Technical Specification 3/4.3.2 setpoint value is 3804 VAC with an allowable setpoint value of 3728 VAC. NED determined some equipment required to mitigate an accident may not have been able to operate during a degraded voltage event at the current Technical Specification setpoint of 3804 VAC. It was determined this issue is reportable to the NRC under 10CFR50.73(a)(2)(v), any event or condition that alone could have prevented the fulfillment of the safety function of structures or systems that are needed to: a) Shutdown the reactor and maintain it in a safe shutdown condition, b) Remove residual heat, c) Control the release of radioactive material, or d) Mitigate the consequences of an accident. The NRC was verbally notified on July 24, 1992 at 1523 by the Shift Control Room Engineer via the Emergency Notification System.

In August of 1991, the NRC discovered during the Dresden Electrical Distribution System Functional Inspection (EDSFI) that the original safety related bus degraded voltage setpoint calculation was not adequate. Subsequently, the Nuclear Engineering Department requested that Sargent and Lundy perform a preliminary evaluation of the Byron Station auxiliary power system to verify the adequacy of the existing degraded voltage setpoint as a result of the Dresden audit. A critical voltage calculation was performed in April 1992 to determine an interim degraded voltage setpoint pending a detailed evaluation of each safety related bus (Refer to ENC-QE-40.1 dated April 30, 1992 and Onsite Review 92-093). This calculation used a composite worst case model of Byron's and Craidwood's eight safety related buses to determine a single setpoint that bounded all four units. The voltage analysis was performed at the maximum expected loading during a Loss of Coolant Accident (LOCA) with all safety related loads being supplied from the System Auxiliary Transformers. The critical voltage was defined as the lowest safety related bus voltage necessary to ensure the continuous duty safety related motors and 120 VAC distribution circuits have sufficient voltage to perform their intended safety function. NED determined some equipment may potentially have insufficient voltage to operate at the degraded voltage setpoint value of 3804 VAC. NED recommended raising the degraded voltage setpoint from 3804 VAC to 3935  $\pm$  5 VAC, which assured adequate voltages required for equipment to function during a Loss of Coolant Accident (LOCA) pending specific detailed calculations. The calculation results were transmitted to Byron Station on April 30, 1992 and the interim degraded voltage setpoints were installed in early May 1992.

On July 24, 1992, NED proposed a final degraded voltage setpoint of 3847 VAC and an allowable value of 3793.3 VAC. These values are contingent on installation of several modifications and evaluation of some plant equipment. The operability assessment completed on April 30, 1992 is still valid and the interim conservative setpoint (3935  $\pm$  5 VAC) is still acceptable.

Discussions with NED determined some equipment required to mitigate an accident may not have been able to operate at voltages that could have occurred during a degraded voltage event at the previous 3804 VAC setpoint. The following plant equipment may have potentially had insufficient voltage to start and accelerate at the original degraded voltage relay setpoint of 3804 VAC under a LOCA with sustained offsite power scenario:

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TEXT      Energy Industry Identification System (EIIS) codes are identified in the text as [XX]

B. DESCRIPTION OF EVENT: (continued)

1AF01PB-C	Diesel Driven AF Pump Gearbox Lube Oil Pump
1D001PB	Diesel Oil Transfer Pump
00G06J	H2 Recombiner Heat Exchanger Fan
00G06J	H2 Recombiner Blower
1PS48J	H2 Analyzer Sample Pump
0VC03CA	Control Room Makeup Filter Unit Fan
1VD02CB	Diesel Oil Storage Room Exhaust Fan
1VD02CC	Diesel Oil Storage Room Exhaust Fan
0W001PA	Control Room Chiller Chilled Water Pump

NED also determined the following equipment may have potentially had insufficient voltage for steady state operation at the original degraded voltage relay setpoint of 3804 VAC under a LOCA with sustained offsite power scenario:

1AF01PB-C	Diesel Driven AF Pump Gearbox Lube Oil Pump
1D001PB	Diesel Oil Transfer Pump
1D001PC	Diesel Oil Transfer Pump
1DG01KB-A	Diesel Generator 1B Prelube Pump
1DG01KB-C	Diesel Generator 1B Jacket Circulating Water Pump
1MS018B	S/G Atmospheric Relief Valve B
00G06J	H2 Recombiner Heat Exchanger Fan
00G06J	H2 Recombiner Blower
1PS48J	H2 Analyzer Sample Pump
0VA03CA	Auxiliary Building Charcoal Booster Fan 0A
0VA03CE	Auxiliary Building Charcoal Booster Fan 0E
0VA04CA	Fuel Handling Building Charcoal Booster Fan
1VA01CA	SX Pump Cubicle Cooler
1VA01CD	SX Pump Cubicle Cooler
1VA01CE	SX Pump Cubicle Cooler
1VA01CF	SX Pump Cubicle Cooler
1VA02CB	RHR Pump Cubicle Cooler
1VA02CC	RHR Pump Cubicle Cooler
1VA03CA	CS Pump Cubicle Cooler
1VA03CB	CS Pump Cubicle Cooler
1VA03CE	CS Pump Cubicle Cooler
1VA03CF	CS Pump Cubicle Cooler
1VA04CB	SI Pump Cubicle Cooler
1VA04CC	SI Pump Cubicle Cooler
1VA06CC	CV Charging Pump Cubicle Cooler
1VA06CD	CV Charging Pump Cubicle Cooler
1VA08CA	Motor Driven AF Pump Cubicle Cooler
0VC01CA	Control Room Supply Fan
0VC02CA	Control Room Return Fan
0VC03CA	Control Room Makeup Filter Fan
1VD02CB	Diesel Oil Storage Room Exhaust Fan
1VD02CC	Diesel Oil Storage Room Exhaust Fan
1VD03CA	Diesel Generator Room Exhaust Fan
1VE03C	Battery Room 111 Exhaust Fan



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TEXT Energy Industry Identification System (EIIS) codes are identified in the text as [XX]

**B. DESCRIPTION OF EVENT:** (continued)

1VE05C	Miscellaneous Electrical Equipment Room (Division 12) Exhaust Fan
1VP01CA	RCFC Fan
1VP01CC	RCFC Fan
1VX01C	Division 12 ESF Switchgear Room Vent Fan
1VX03C	Cable Spreading Room Vent Fan
1VX04C	Division 11 ESF Switchgear Room Vent Fan
0W001CA-A	Control Room Chiller Oil Pump
0W001CA-B	Control Room Chiller Purge Compressor
0W001PA	Control Room Chiller Chilled Water Pump

The Unit 2 and redundant division counterpart to these loads also may have had insufficient voltage.

**C. CAUSE OF EVENT:**

The cause of this event was the previous degraded voltage setpoint calculation did not evaluate all plant equipment on each safety related bus for the effect of the 4KV bus degraded voltage setpoint. Specifically the degraded voltage relay setpoint calculation did not:

- A. Assess running capability of Class 1E motor loads below the 480 VAC safety related switchgear distribution level. (i.e. Motors fed from MCCs were not evaluated).
- B. Assess starting capability of Class 1E motor loads below the 4160 VAC level.
- C. Assess the 120 VAC starter contactors' capability to energize at the degraded voltage setpoint, as loads on MCCs were not evaluated.
- D. Assess the capability of safety equipment to function on all 120 VAC levels (e.g. MCC distribution panel loads).

After further review, it was determined the original setpoint was not adequate.

**D. SAFETY ANALYSIS:**

Plant and public safety was not affected by this event. The potential equipment list was based on NEMA required voltages of  $460 \pm 10\%$  VAC (414-506 VAC) for operation of the equipment. A list of equipment that would not operate cannot specifically be determined since some equipment may in fact operate at a voltage less than 414 VAC. Compiling this list would require testing each piece of equipment at degraded voltage conditions or obtaining vendor concurrence that the equipment would operate at voltages less than 414 VAC. NED decided to allocate resources in determining a new degraded voltage setpoint and not to looking backward in time to assess prior equipment availability at the original setpoint value. Byron Station has never reached this setpoint during normal plant operating history.

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#### E. CORRECTIVE ACTIONS:

NED issued a proposed final degraded voltage setpoint of 3847 VAC and an allowable value of 3793.3 VAC. These values are contingent on installation of Unit Substation/Motor Control Center (MCC) transformer tap changes, installation of smaller tolerance degraded voltage relays, evaluation of several 120 VAC loads, a review of motor operated valves, and review of circulating water pump motor operation. Modifications to install tap changes (M6-1/2-92-632) and new degraded voltage relays (M6-1/2-91-716) are currently scheduled for installation during B1R05 (2/93) and B2R04 (9/93). Modification M6-2-92-632 was partially installed in April 1992 by changing taps on Buses 231X and 232X to provide a 2.5% voltage boost at the 480 VAC buses. Modification M6-2-92-632 also requires tap changes on buses 231Z and 232Z as a result of the final degraded voltage setpoint calculation. A similar modification is also planned for Unit 1 (Buses 131X, 132X, 131Z and 132Z). After NED determines the final degraded voltage setpoint, the applicable Technical Specifications and Final Safety Analysis Report changes will be made.

The degraded voltage relay setpoint was changed in May 1992 on all four safety related buses (141, 142, 241 and 242) to  $3935 \pm 5$  VAC. This interim setpoint provided additional margin and assured that adequate voltages were available for the continuous operation of all safety related equipment required to function during a Loss of Coolant Accident (LOCA) pending the previously mentioned specific detailed calculations. The following contingency actions recommended in Onsite Review (OSR) 92-063 will also be maintained until the previously mentioned modifications are installed:

- 1) The degraded voltage trip setpoint on all four ESF buses (141, 142, 241 and 242) was adjusted to  $3935 \pm 5$  VAC in May 1992 and will remain in place until modifications are installed.
- 2) The annunciator response procedures (BAR 1/2-21-C7 and BAR 1/2-22-C7) were revised to include the new degraded voltage relay setpoint and enhanced operator actions in the event of a degraded voltage condition.
- 3) System Power Supply Office (SPSO) and the Load Dispatcher were made aware of the degraded voltage issue in the event switchyard voltage would have to be adjusted.

#### F. RECURRING EVENTS SEARCH AND ANALYSIS:

##### a) EVENT SEARCH (DIR, LER)

Braidwood LER 92-008

##### b) INDUSTRY SEARCH (OPEX's NPRDS)

None found.

##### c) NWR

B92586-93, B94398-401, B94541-4

##### d) ANALYSIS

No trend identified.

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G. COMPONENT FAILURE DATA:

<u>MANUFACTURER</u>	<u>NOMENCLATURE</u>	<u>MODEL NUMBER</u>	<u>MFG PART NUMBER</u>
Not Applicable			

H. OTHER RELATED DOCUMENTS:

IEN 91-029, Deficiencies Identified During Electrical Distribution System Functional Inspection  
OMR - 225, Drifting of Undervoltage Relays

I. EFFECTIVENESS REVIEW:

None scheduled.

J. ADDITIONAL DATA:

- a) Affected Technical Specification: 3/4.3.2, Tables 3.3-3 and 3.3-4
- b) Procedures: None
- c) Cause Code: BD2.4
- d) Equipment Involved: 1AP11E, 1AP13E, 1AP98E, 1AP99E, 2AP10E, 2AP12E, 2AP98E and 2AP99E
- e) Other: Analysis, Voltage Setpoint