



Commonwealth Edison
Braidwood Nuclear Power Station
Route #1, Box 84
Braceville, Illinois 60407
Telephone 815/458-2801

August 24, 1992
BW/92-0440

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

Dear Sir:

The enclosed Licensee Event Report from Braidwood Generating Station is being transmitted to you in accordance with the requirements of 10CFR50.73(a)(2)(v) and 10CFR50.73(a)(2)(i), which requires a 30-day written report.

This report is number 92-008-00, Docket No. 50-456.

K. L. Kofron
Station Manager
Braidwood Nuclear Station

KLK/AJS/dla
ZCREG

Enclosure: Licensee Event Report
No. 92-008-00

cc: NRC Region III Administrator
NRC Resident Inspector
INPO Record Center
CECo Distribution List

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PDR ADOCK 05000456
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LICENSEE EVENT REPORT (LER)

Form Rev 2.0

Facility Name (1)

Docket Number (2)

Page (3)

Braidwood 1

0 | 5 | 0 | 0 | 0 | 4 | 5 | 6 | 1 | of | 0 | 6

Title (4)

Non Conservative Degraded 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 Names	Docket Number(s)
0 7	2 4	9 2	9 2	0 0 8	0 0	0 8	2 3	9 2	Braidwood 2	0 5 0 0 0 4 5 7 0 5 0 0 0 1 1

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)						
1 0 0		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						
		20.405(a)(1)(iii)	X 50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	in Abstract						
		20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	below and in						
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	Text)						

LICENSEE CONTACT FOR THIS LER (12)

Name	TELEPHONE NUMBER
G. Sharpe, Technical Staff Engineer	AREA CODE: 8 1 5 4 5 8 - 2 8 0 1
Ext. 2544	

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

SUPPLEMENTAL REPORT EXPECTED (14)

Expected Submission Date (15)	Month	Day	Year
Yes (if yes, complete EXPECTED SUBMISSION DATE) X NO			

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

In August of 1991, the NRC discovered during the Dresden Electrical Distribution System Functional Inspection (EDSFI) that the original 4KV ESF Bus degraded voltage setpoint calculation was not adequate. Nuclear Engineering Department (NED) requested that Sargent and Lundy perform a preliminary evaluation of Braidwood Station to verify the adequacy of the existing degraded voltage setpoint. A critical voltage calculation was performed in April 1992 to determine an interim degraded voltage setpoint. The calculation results were transmitted to Braidwood Station on April 30, 1992, and the interim setpoints were installed in early May 1992. On July 24, 1992, Braidwood Station was notified by NED that some equipment required to mitigate the consequences of an accident may not have been able to operate during a degraded voltage event. The cause was that the previous degraded voltage setpoint calculation did not evaluate all plant equipment on each safety related bus. NED issued a proposed final degraded voltage setpoint of 3986.4 VAC and an allowable value of 3930.6 VAC. The annunciator response procedures were revised to include the new degraded voltage relay setpoint. There have been no previous occurrences of non conservative degraded voltage setpoints.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION										Form v 2.0	
FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)						Page (3)			
		Year	///	Sequential Number	///	Revision Number					
Braidwood 1	0 5 0 0 0 4 5 6	9 2	-	0 0 8	-	0 0	0 2	OF	0 6		
TEXT Energy Industry Identification System (EIIIS) codes are identified in the text as [XX]											

A. PLANT CONDITIONS PRIOR TO EVENT:

UNIT: BRAIDWOOD 1;
 EVENT DATE: July 24, 1992; EVENT TIME: 1425;
 MODE 3 - Power Operation Rx Power 100%
 RCS [AB] Temperature/Pressure NOT / NOP

B. DESCRIPTION OF EVENT:

On July 24, 1992, Braidwood Station was notified by Nuclear Engineering Department (NED) on the results of the final degraded voltage setpoint study for the 4KV ESF Buses. The degraded voltage setpoint is responsible for shedding loads off the 4KV ESF Bus and starting the diesel generator. The current Technical Specification 3/4.3.2 setpoint value is 3804 VAC with an allowable value of 3728 VAC. NED determined some equipment required to mitigate the consequences of an accident may not have been able to operate during a degraded voltage event at the current Technical Specification setpoint of 3804 VAC.

In August of 1991, the NRC discovered during the Dresden Electrical Distribution System Functional Inspection (EDSFI) that the original 4KV ESF Bus degraded voltage setpoint calculation was not adequate. NED requested that Sargent and Lundy perform a preliminary evaluation of the Braidwood 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 EMC-QE-40.1 dated April 30, 1992 and Onsite Review 92-033). This calculation used a composite worst case model of Byron and Braidwood's eight safety related buses to determine a single setpoint that bounded all four units. The voltage analysis was performed at the maximum expected load during a LOCA with all safety 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 an interim compensatory measure to raise the degraded voltage setpoint from 3804 VAC to 3935 +/- 5 VAC based on the critical voltage calculation results. This interim setpoint provided additional margin to assure that adequate voltages were available for the continuous operation of all safety related equipment required to operate during a LOCA pending specific detailed calculations. The calculation results were transmitted to Braidwood 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 3986.4 VAC and an allowable value of 3930.6 VAC. These values are contingent on installation of some modifications and evaluation of some plant equipment, currently scheduled to be completed during the next units' refueling outage. The operability assessment completed on April 30, 1992 is still valid and the interim degraded voltage setpoint (3935 +/- 5 VAC) is still acceptable.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

Form Rev 2.0

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			Page (3)		
		Year	Sequential Number	Revision Number			
Braidwood 1	0 5 0 0 0 4 5 6	9 2	- 0 0 8	- 0 0	0 3	OF	0 6

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

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

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
 1P548J 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 setpoint of 3804 VAC under a LOCA with a sustained degraded grid voltage:

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
 1HS01BB Atmospheric Relief Valve B
 00G06J H2 Recombiner Heat Exchanger Fan
 00G06J H2 Recombiner Blower
 1P548J 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

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

Form Rev 2.0

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)				Page (3)		
		Year	Sequential Number	Revision Number				
Braidwood 1	0 5 0 0 0 4 5 6	9 2	- 0 0 8	- 0 0	0 4	OF	0 6	

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

- 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
- 1VE05C Misc. Elec. Equip. Room (Division 12) Exhaust Fan
- 1VP01CA RCFC Fan
- 1VP01CC RCFC Fan
- 1VX01C Div. 12 ESF Switchgear Room Vent Fan
- 1VX03C Cable Spreading Room Vent Fan
- 1VX04C Div. 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.

The appropriate NRC notification via the ENS phone system was made on July 24, 1992 at 1530 pursuant to 10CFR50.72(B)(2)(iii).

This event is being reported pursuant to 10CFR50.73(a)(2)(v)(D) - any event or condition that alone could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident.

This event is also being reported pursuant to 10CFR50.73(a)(2)(i)(B) - any operation or condition prohibited by the plant's Technical Specifications.

C. CAUSE OF EVENT

The cause of this 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 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 MCC's were not evaluated).
- B. Assess starting capability of Class 1E motor loads below the 4100 VAC level.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

Form Rev 2.0

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)				Page (3)		
		Year	Sequential Number	Revision Number				
Braidwood 1	0 5 0 0 0 4 5 6	9 2	- 0 0 8	- 0 0	0 5	OF	0 6	

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

- C. Assess the 120 VAC starter contactor's capability to energize at the degraded voltage setpoint, as loads on MCC's were not evaluated.
- D. Assess the capability of safety equipment to function on all 120 VAC levels (e.g. MCC distribution panel loads).

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

D. SAFETY ANALYSIS

Plant and public safety were not affected by this event. The potential equipment list was based on NEMA required voltages of 460 +/- 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. Braidwood Station has never reached this setpoint during normal plant operating history. Bus voltage is verified to be between 3975V and 4465V on a weekly basis by performance of Operating Surveillance 1(2) BwOS 8.3.1-1(2). This ensures the bus voltage is above the critical voltage setpoint of 3930V.

E. CORRECTIVE ACTIONS:

NED issued a proposed final degraded voltage setpoint of 3986.4 VAC and an allowable value of 3930.6 VAC. The degraded voltage analysis has defined a requirement to terminate spare conductors of cables 1VC242 and 1VC574, also the existing ITE-27D degraded voltage relays will be replaced with ITE-27N relays. These changes will be done during A1R03 and A2R03 per M20-1/2/91/027. After NED determines the final setpoints, the applicable Technical Specifications and Final Safety Analysis Report changes will be made.

The degraded voltage relay setpoints were changed in May 1992 on all 4KV ESF Buses to 3935 +/- 5 VAC as an interim compensatory measure. This setpoint change provides additional margin to assure adequate voltages are available for the continuous operation of all safety related equipment required to operate during a LOCA pending the previously mentioned specific detailed calculation. The following contingency actions recommended in Onsite Review 92-033 will also be maintained until the previously mentioned modifications are installed:

- 1) The degraded voltage relay setpoint on all 4KV ESF Buses was changed to 3935 +/- 5 VAC.
- 2) The annunciator response procedures (BwAR1/2-21-C7 and BwAR1/2-22-C7) were revised to include the new degraded voltage relay setpoint (94.6%) to enhance operator actions in the event of a degraded voltage condition.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

Form Rev 2.0

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			Page (3)		
		Year	Sequential Number	Revision Number			
Braidwood 1	0 5 0 0 0 4 5 6	9 2	- 0 0 8	- 0 0	0 6	Of	0 6

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

F. PREVIOUS OCCURRENCES:

There has been no previous reportable occurrences of non-conservative degraded voltage setpoints.

G. COMPONENT FAILURE DATA:

This event was not the result of component failure, nor did any component failure contribute to the severity of this event.