



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

9208250304 920824
PDR ADOCK 05000456
S PDR

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LICENSEE EVENT REPORT (LER)

Form Rev 2.0

Facility Name (1)

Docket Number (2)

Page (3)

Braidwood 1

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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)	1 0 0	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
		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
	AREA CODE
G. Sharpe, Technical Staff Engineer	Ext. 2544
	8 1 5 4 5 8 - 2 8 0 1

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	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.

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Braidwood 1				0	5	0	0	0	4	5	6	9	2	-	0	0	8	-	1	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.

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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
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 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
1MS01BB	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 OA
0VA03CE	Auxiliary Building Charcoal Booster Fan OE
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

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1VA04CC	S1 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
0WD01CA-A	Control Room Chiller Oil Pump
0WD01CA-B	Control Room Chiller Purge Compressor
0WD01PA	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 4160 VAC level.

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- 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 (BwARI/2-21-C7 and BwARI/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.

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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.