

Commonwealth Edison Dresden Nuclear Power Station 6500 North Dresden Road Morris, Illinois 60450 Telephone 815/942-2920

May 9, 1994

GFSLTR 94-0148

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

Licensee Event Report 94-010, Docket 50-237 is being submitted as required by Technical Specification 6.6, NUREG 1022 and 10CFR50.73(a)(2)(v).

Sincerely,

Gary F) Spedl Station Manager Dresden Station

GFS/JS/cfq

Enclosure

cc: J. Martin, Regional Administrator, Region III NRC Resident Inspector's Office File/NRC File/Numerical

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NRC FORM 366 (5-92)			U.S.	NUCLEAR	REGULATO	RY COM	ISSION	APPROVED BY ONB NO. 3150-0104 EXPIRES 5/31/95					
LICENSEE EVENT REPORT (LER) ESTIMATED BURDEN PER RESPONSE TO COMPLY W THIS INFORMATION COLLECTION REQUEST: 50.0 H FORWARD COMMENTS REGARDING BURDEN ESTIMATE THE INFORMATION AND RECORDS MANAGEMENT BRA (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSI WASHINGTON, DC 20555-0001, AND TO THE PAPERW REDUCTION PROJECT (3150-0104), OFFICE MANAGEMENT AND BUDGET, WASHINGTON, DC 20503. EACLUARY NAME (1)										COMPLY WITH : 50.0 HRS. ESTIMATE TO MENT BRANCH COMMISSION, IE PAPERWORK OFFICE OF : 20503.			
FACILITY NAME (1) Dresden Nuclear Power Station, Unit 2 and 3								DOCKET	NUMBER (2) 05000237		1	PAGE (3) OF 7	
TITLE (4) HPCI Room Cooler Fan Minimum Starting Voltage Above Second Level Undervoltage Relay Setpoint													
EVENT DAT	E (5)		LER NUMBER (6)		REPO	RT DATE	(7)		OTHER FACIL	ITIES INVO	DLVED (8)	
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OPERATING THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check						one or mor	e) (11)) .					
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On April 12, 1994 with Unit 2 at 99% rated power and Unit 3 in a Refuel Outage, a review of Sargent & Lundy calculation 8982-19-19-2 was performed towards closure of an NRC unresolved item of Engineering and Technical Support Inspection No. 94-003. It was discovered during the review that the control circuit contactor (motor starter) minimum starting voltage for the HPCI Room Cooler Fans was above the set point for the second level degraded voltage relay settings. Therefore, it could not be assured that the HPCI Room Cooler Fans would start. The apparent cause of the event is inadequate design calculations relative to the effects of degraded voltage on the 120 V AC motor starter for the HPCI Room Cooler Fans. Commonwealth Edison Company (CECo) will replace the existing Size 2 full voltage non-reversing contactors (motor starters) with new General Electric (G.E.) Series 300 Size 1 contactors (motor starters). By reducing the contactor size and improving the pickup of the coil, the burden on the control circuit is reduced and the contactor voltage is improved to the extent that the existing set points for the second level degraded voltage relays do not affect the operation of the HPCI Room Cooler Fans.

NRC FORM 366A (5-92)	U.S. NUCLEAR R	EGULATORY CONNISSION	APPROVED BY ONB NO. 3150-0104 EXPIRES 5/31/95					
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EVENT IDENTIFICATION:

HPCI Room Cooler Fan Minimum Starting Voltage Above Second Level Undervoltage Relay Setpoint

A. <u>PLANT CONDITIONS PRIOR TO EVENT</u>:

Unit: 2	2 (3)		Even	t Date: 4/12/94		Event T	ime:	17:15
Reactor	Mode:	N (N)	Mode Name:	Run (Refuel)	Power	Level:	99%	(0,%)
Reactor	Coolant	System	Pressure	1000 psig (0 psig)				

B. DESCRIPTION OF EVENT:

On April 12, 1994 with Unit 2 at 99% rated power and Unit 3 in a Refuel Outage, during a review of Sargent & Lundy calculation 8982-19-19-2 it was discovered that the control circuit contactor (motor starter) pick up voltages for the HPCI Room Cooler Fans were above the set point for the second level degraded voltage relay settings. The calculation was originally prepared during August, 1989 and was being reviewed in response to an NRC unresolved item of Engineering and Technical Support Inspection No. 94-003. The review identified that under degraded voltage conditions for Unit 2, only 86.8 Volts is postulated to be available at the control circuit contactor (motor starter) when 97.72 Volts is required to assure its operation. Similarly, under degraded voltage conditions for Unit 3, only 87.7 Volts is postulated to be available at the motor starter when 97.70 Volts is required to assure its operation. Therefore, it could not be assured that the HPCI Room Cooler Fans would start. Additionally, the review identified that the concern was isolated to the 120 Volt motor starters, and that the voltages at the 480 Volt HPCI Room Cooler Fan motors were calculated to be acceptable.

According to CECo's Nuclear Engineering Department Mechanical Structural Group (NED M&S) letter concerning the Emergency Core Cooling System (ECCS) Room Cooler Operability Requirements, dated February 3, 1993, CHRON #198404, the HPCI room cooler fans are required to function in the event of a DBA LOCA. These room cooler fans are fed from Unit 2 480V Bus 29 (MCC 29-4) and Unit 3 480V Bus 39 (MCC 39-1); both of these busses are affected by their respective second level degraded voltage relay settings. (See attached sketch, Unit 3 is similar).

C. <u>CAUSE OF EVENT</u>:

This LER is submitted in accordance with 10CFR50.73(a)(2)(V), which requires the reporting of an event or condition that alone could have prevented fulfillment of the safety function of systems needed to mitigate the consequences of an accident.

The apparent cause of the event is inadequate design calculations relative to the effects of degraded voltage on the 120 V AC motor starter for the HPCI Room Cooler Fans. The analysis for the HPCI Room Cooler Fan motor starter circuit is contained in Sargent & Lundy (S&L) Calculation 8982-19-19-2. During the 1989 time frame the effects of degraded voltage were not readily understood throughout the industry.

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NRC Inspection Reports, numbers 50-237/91038 (DRS) and 50-249/91042 (DRS), identified unresolved degraded voltage concerns with Units 2 & 3. These reports documented a follow up inspection to previously identified Electrical Distribution Safety Functional Inspection (EDSFI) concerns. As a result of those NRC unresolved degraded voltage concerns, CECo committed to review the degraded voltage calculations. This review was completed in January, 1992, and the HPCI Room Cooler Fan control circuit contactor (motor starter) was identified as one of the circuits that failed during that review and was determined to need a more detailed calculation. The HPCI Room Cooler Fan control circuit contactor (motor starter) was contained in S&L Calculation 8982-19-19-2.

This calculation was placed on a punchlist, with other circuits that also failed the initial review, for recalculation but given a low priority since it was assumed at that time that the HPCI System was primarily a DC system and that no AC electrical components affected its capability to perform its required Safety function. This assumption was based upon discussions with Licensed Senior Reactor Operators (SROS). Subsequent to the setting of the priorities for recalculation of the degraded voltage calculations which failed the review, the Nuclear Engineering Department Mechanical Structural Group (NED M&S) issued a letter to Dresden Station describing the Emergency Core Cooling System (ECCS) Room Cooler Operability Requirements; this letter was based on the NFS Room Cooler Study. The letter was issued on February 3, 1993 (CHRON # 198404).

The NFS Room Cooler Study captured the results of a meeting held September 15, 1992 between NFS, Nuclear Licensing Department (NLD) and the NRC (NRR Projects and Technical Staff). It was during that meeting that CECo and the NRC discussed the natural circulation within the HPCI room and corner rooms. Both parties agreed that the HPCI Room Cooler Fans were necessary to ensure adequate circulation within the HPCI room. It was concluded at that time that the HPCI Room Cooler Fans would be required to be Safety Related. As a result of that conclusion the NED M&S letter identified that the HPCI Room Cooler Fans would be required to function in the event of a DBA LOCA. The significance of the NFS Room Cooler Study (relative to the importance of the HPCI Room Cooler Fans) was not recognized and the priority for the recalculation of S&L Calculation 8982-19-19-2 was not elevated accordingly.

In response to an unresolved item of NRC Engineering and Technical Support Inspection No. 94-003 CECo elevated the priority for the recalculation of S&L Calculation 8982-19-19-2. This resulted in the discovery of the operability concern of the HPCI Room Cooler fans under degraded voltage conditions concurrent with DBA LOCA.

D. <u>SAFETY ANALYSIS</u>:

The likelihood of a degraded voltage event which would result in a degraded voltage that resides in the narrow region of vulnerability concurrent with DBA LOCA is remote.

Abnormal Operating Procedures give guidance to Operating Personnel to take actions in the event of a degraded voltage condition. The Abnormal Operating Procedures are entered when the computer alarm which measures emergency bus voltage annunciates. The alarm value is above the bus critical voltage value,

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and provides margin for the Nuclear Station Operator (NSO) to attempt to restore emergency bus voltage. Voltage restoration is accomplished by raising the switchyard voltage through raising main generator reactive power output and through switchyard configuration changes. If required, specific plant loads are started or stopped as necessitated by plant conditions.

Failure of the HPCI Room Cooler Fans to start would lead to excessive temperatures in the HPCI room and degradation of the Safety Related equipment in the HPCI room. The HPCI room temperature isolation setpoint is nominally set at 180 degrees Fahrenheit, with an uncertainty of approximately 5 degrees Fahrenheit. A maximum temperature of 175 degrees Fahrenheit is assumed to be the lowest temperature that would result in isolation of the HPCI steam lines.

However, the "Small Break Analysis" in General Electric documents NEDO-21082-02-1A & NEDO-24146A (for Dresden Units 2 & 3 and Quad Cities Units 1 & 2) identified that although the most severe equipment failure is loss of HPCI for small breaks, the reactor vessel depressurizes relatively slowly (or not at all) and the Peak Cladding Temperature (PCT) of the fuel is between 1500 - 1600 degrees Fahrenheit. This is still bounded by the Large Break LOCA with single failure of the LPCI injection valve which results in a PCT for the fuel of 2045 degrees Fahrenheit. These PCTs are well below the 10 CFR 50.46 limit of a PCT for the fuel of 2200 degrees Fahrenheit.

Therefore, the safety significance of this event is considered to be minimal.

E. <u>CORRECTIVE_ACTIONS</u>:

The corrective actions taken with regard to this event are the following:

An Operability Evaluation was performed in accordance with CECo ENC Procedure ENC-QE-40.1. This evaluation identified that the only Compensatory Action was to start the Unit 2 HPCI Room Cooler Fan and keep it running until the degraded voltage concern was addressed. The Unit 3 HPCI Room Cooler Fan was not required as the Unit is shut down for a refuel outage.

The Unit 2 HPCI Room Cooler Fans were manually started February 12, 1994 at approximately 15:00 hours and operating orders (via Caution Card) were given to keep the fans running until such time that CECo is assured that the HPCI Room Cooler Fans would start under degraded voltage conditions. This action was completed prior to the completion of the Operability Evaluation.

The HPCI Room Cooler Fan's control circuit contactors (motor starters) will be replaced under Nuclear Work Request (NWR) numbers D25259 and D25260 for Unit 2 and Unit 3 respectively. The existing Size 2 full voltage non-reversing contactors (motor starters) will be replaced by new General Electric (G.E.) Series 300 Size 1 contactors (motor starters). The HPCI Room Cooler Fans are rated at 3 hp; G.E. vendor data indicates that a Size 1 contactor may be utilized for all motor sizes up to 10 hp. These motor starters are equipped with 75 % pickup coils. By reducing the contactor size and improving the pickup of the coil, the burden on the control circuit is reduced and the contactor voltage is improved to the extent that the existing set points for the second level degraded voltage relays do not affect the operation of the HPCI Room

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Cooler Fans. These NWRs will be worked in late May and June, 1994 (NTS # 237-180-94-01001).

The impact of the failure of the AC supplied HPCI Room Cooler Fans under degraded voltage conditions concurrent with DBA LOCA will be evaluated by CECo Engineering. Further calculations, FSAR changes, etc., will be performed if required. A Supplemental Report will be issued to present the results of the Engineering evaluation. (NTS # 237-180-94-01002)

F. <u>PREVIOUS OCCURRENCES</u>:

LER/Docket Numbers <u>Title</u>

91-021/050237

Improper Setpoint of Second Level Undervoltage Relays Due to Management Deficiency

During an Electrical Distribution System Functional Inspection (EDSFI), the NRC inspection team questioned whether the setting of the Second Level Undervoltage relays would provide adequate protection to Class 1E equipment. An Engineering review was performed. The review resulted in implementation of compensatory measures.

91-037/050237

Unit Emergency Bus Undervoltage Relays Susceptible to Setpoint Drift Due to Design Deficiency

After reviewing a 10CFR Part 21 notification on ABB Type 27N Relays, Dresden Station was informed by Corporate Engineering that the Units 2 and 3 4160 Volt Emergency Bus second level undervoltage relays were susceptible to setpoint drift and loss of time delay function due to elevated radiation dose during a postulated Loss of Coolant Accident (LOCA) and significant fuel failure. This setpoint drift could lead to a failure of the LPCI and Core Spray pumps to restart. During a LOCA event, potential loss of the time delay function may lead to an unnecessary transfer of power to the unit Emergency Diesel Generators during Emergency Core Cooling System (ECCS) pump motor starts. As a compensatory measure, the 2B and 3A Core Spray subsystem pumps were taken out of service and both units placed in a 7-day limiting condition for operation (LCO). These systems are the source of elevated dose rates associated with the relays during the postulated accident. The relays were temporarily altered by removing the components susceptible to setpoint drift. The LCOs were then terminated.

92-004/050249

Improper Setpoint of Second Level Undervoltage Relays Due to Management Deficiency

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With Unit 3 shutdown, NED notified Dresden Station that Unit 3 4160 Volt Buses 33-1 and 34-1 calculated critical voltages, after plant modifications, would be 3832 Volts and 3792 Volts, respectively. Based on these calculations and the fact that modifications had to be performed to achieve these voltages, Unit 3 had been in an unanalyzed condition. Corrective actions were to design and install necessary modifications prior to any mode change on either unit.

G. <u>COMPONENT FAILURE DATA</u>:

N/A



SKETCH 1