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SUBJECT: LER 89-044-00:on 891128,HPCS sys potentially inoperable during DBA due to undersized thermal overloads.

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WASHINGTON PUBLIC POWER SUPPLY SYSTEM

P.O. Box 968 • 3000 George Washington Way • Richland, Washington 99352

December 28, 1989

Docket No. 50-397

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

Subject: NUCLEAR PLANT NO. 2
LICENSEE EVENT REPORT NO. 89-044

Dear Sir:

Transmitted herewith is Licensee Event Report No. 89-044 for the WNP-2 Plant. This report is submitted in response to the report requirements of 10CFR50.73 and discusses the items of reportability, corrective action taken, and action taken to preclude recurrence.

Very truly yours,

C. M. Powers

C. M. Powers (M/D 927M)
WNP-2 Plant Manager

CMP:lg

Enclosure:
Licensee Event Report No. 89-044

cc: Mr. John B. Martin, NRC - Region V
Mr. C. J. Bosted, NRC Site (M/D 901A)
INPO Records Center - Atlanta, GA
Ms. Dottie Sherman, ANI
Mr. D. L. Williams, BPA (M/D 399)

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NRC FORM 366 (6-89) | U.S. NUCLEAR REGULATORY COMMISSION | APPROVED OMB NO. 3150-0104 EXPIRES: 4/30/92

ESTIMATED BURDEN PER RESPONSE TO COMPLY WTH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Washington Nuclear Plant - Unit 2	0 5 0 0 0 3 9 7	1 OF 0 5

TITLE (4) HIGH PRESSURE CORE SPRAY SYSTEM POTENTIALLY INOPERABLE DURING A DESIGN BASIS ACCIDENT DUE TO UNDERSIZED THERMAL OVERLOADS

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)
1 1	2 8	8 9	8 9	0 4 4	0 0	1 2	2 8	8 9		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9)	1
POWER LEVEL (10)	1 0 0

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)

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 in Abstract below and in Text, NRC Form 366A)
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	TELEPHONE NUMBER
R. E. Fuller, Compliance Engineer	AREA CODE 5 0 9 3 7 7 - 2 5 0 1 1 EXT 2 7 9 7

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)

On November 28, 1989, an Electrical Design Engineer identified six incorrectly sized thermal overload heaters that could have prevented the High Pressure Core Spray (HPCS) from performing its safety function under design basis conditions. This condition was discovered by the Engineer during performance of the Supply System initiated AC Electrical Distribution System Safety System Functional Inspection (SSFI) effort.

Corrective actions include: 1) the HPCS system and HPCS diesel-generator were declared inoperable, 2) the NRC was notified of HPCS inoperability, 3) the undersized overload heaters were replaced with the correctly sized heaters, and 4) the HPCS system and diesel-generator were subsequently returned to operable status.

The primary root cause of undersized heaters was the design selection was less than specified in the FSAR and the Architect/Engineer's (A/E) selection procedure. Contributing causes include personnel accountability was not clearly defined, the engineering criteria in the procedures did not cover the situation, A/E specifications were not fully definitive for proper selection of the particular thermal overloads, and review of the heater selection did not detect the errors.

Further corrective actions include revising the thermal overload selection procedures to remove ambiguity, and documenting review of two safety related motor control centers to provide adequate assurance of no generic errors related to improper selection of thermal overloads.

Abstract (contd.)

The safety significance of HPCS inoperability for this event is acceptable because the Technical Specification Limiting Condition for Operation was not exceeded.

Plant Conditions

a) Power Level - 100%
b) Plant Mode - 1

Event Description

On November 28, 1989, an Electrical Design Engineer identified six incorrectly sized thermal overload heaters that could have prevented the High Pressure Core Spray (HPCS) from performing its safety function under design basis conditions. This condition was discovered by the Engineer during performance of the Supply System initiated AC Electrical Distribution System Safety System Functional Inspection (SSFI) effort.

A review of the Motor Control Center (MC-4A) thermal overload heater sizing indicated six thermal overloads were sized such that inadvertent tripping could result if grid voltage were to degrade to a point just above the transfer setpoint (approximately 94% of nominal) and the highest allowable ambient temperature conditions of 104°F existed. The thermal overloads were for the following motors: 1) the Diesel Oil Transfer Pump (DO-P-2) from the HPCS storage tank to the HPCS day tank; 2) the Reactor Building Return Air Fan (RRA-FC-4) to the HPCS pump room fan cooler assembly; 3) the Diesel Building Exhaust Air Fan (DEA-FN-31) for the HPCS DG room; 4) the Service Water Outlet Valve (SW-V-54) to Reactor Building Exhaust Air Cooling Coil (RRA-CC-4); 5) the Service Water Return Valve (SW-V-4C) from the HPCS DG room; and 6) the HPCS Water Leg Pump (HPCS-P-3). Tripping of any one of the six overloads would have jeopardized continued operability of the HPCS system.

Immediate Corrective Action

The HPCS system and HPCS diesel-generator (DG) were declared inoperable at 1300 hours on November 28, 1989. The Technical Specification Action Statements (TSAS) for Section 3.5.1 and 3.8.1.1 were entered at that time. The NRC was notified at 1334 hours of HPCS inoperability per 10CFR50.72(b)(2)(iii)(D). While in the process of replacing the undersized heaters with the correct size, the thermal overload heater for HPCS-P-3 was found to be correctly sized, and therefore, was not replaced. The five remaining overload heaters plus an additional one discovered later to also have been undersized were replaced with correctly sized heaters and tested. The HPCS system and HPCS DG were returned to operable status, and the TSAS 3.5.1 and 3.8.1.1 were exited at 2350 hours on December 1, 1989.

Further Evaluation and Corrective Action

A. Further Evaluation

1. This event is considered reportable per 10CFR50.73(a)(2)(v)(D) as a condition that potentially could have prevented the fulfillment of the safety function of the HPCS (a single train system) to mitigate the consequences of an accident.

2. There were no structures, components, or systems inoperable prior to discovery of the condition which contributed to the condition.

3. The primary root cause was the design selection of six out of twenty overload heaters on MC-4A was less than specified in the FSAR and the Architect/Engineer's (A/E) selection procedure. Contributing causes include personnel accountability was not clearly defined, the engineering criteria in the procedures did not cover the situation, A/E specifications were not fully definitive for proper selection of the particular thermal overloads, and review of the heater selection did not detect the errors.

   3.1 The thermal overload selection criteria for motor-operated valves (MOV) was based upon ensuring motor operation below the degraded bus voltage transfer setpoint and still provide adequate motor protection. The six undersized overloads would provide adequate motor protection, but would not ensure operability just above the transfer setpoint.

   3.2 The design of motor control center MC-4A was performed during the period of engineering turnover from the A/E to the Supply System. Contractor accountability was not clearly defined, which may have resulted in inadequate management oversight. Documents indicate the Supply System assumed the responsibility of MC-4A thermal overload selection using the A/E's selection procedure. Current procedures and management oversight would preclude similar events related to personnel accountability from occurring.

   3.3 The thermal overloads used in the MC-4A were manufactured by General Electric (GE). The engineering criteria in the A/E's selection procedure used by the Supply System did not specifically cover the selection of GE heaters. Information outside of the procedures was required to make a correct selection of the heater size, which could have contributed to the seven selection errors.

   3.4 The A/E specifications for proper selection of the GE thermal overloads for MOVs were not definitive. The specifications indicated the thermal overloads for MOVs are selected two sizes larger than normally selected thermal overloads. Normal was undefined for GE heaters.

4. After further review of MC-4A, an additional thermal overload to the Diesel Building Mixed Air Fan, DMA-FN-31, was determined to be undersized. This one was also replaced with the correct size heater.

5. The probability that other safety related motor control centers have similar thermal overload sizing errors is small for the following reasons: personnel accountability was clearly defined for all other motor control centers, the engineering criteria in the selection procedures covered the specific heaters installed in all of the other motor control centers (i.e., MC-4A was the only motor control center with GE heaters), normal was adequately defined for the other installed heaters, and the review processes were adequate because personnel accountability was clearly defined and the review processes for a given contractor were established and acceptable. Also, two major safety related motor control centers (MC-7-A-A and MC-8-F) were reviewed for similar sizing errors, and no undersized heaters were found. From this sampling and the above arguments, it was concluded that generic selection errors of thermal overloads for safety related equipment does not exist at WNP-2.

6. Upon entering TSAS 3.5.1.c and 3.8.1.1.c for an inoperable HPCS system and an inoperable HPCS diesel-generator, respectively, the action statement for 3.8.1.1.c was complied with when action statement 3.5.1.c was entered. TSAS 3.8.1.1.c requires diesel-generators (DG) numbers 1 and 2 to be started within 4 hours and thereafter at 8 hour intervals and the inoperable HPCS DG must be restored to operable status within 72 hours or declare the HPCS inoperable and take the action required by Specification 3.5.1. In this case the HPCS system was declared inoperable immediately, satisfying TSAS 3.8.1.1.c. Therefore, no actual starts of DG1 and DG2 were required.

B. Further Corrective Action

1. The procedure for sizing overload heaters will be revised to minimize ambiguity and make it easier to apply.

2. Review of MC-7-A-A and MC-8-F will be documented.

Safety Significance

The safety significance of HPCS inoperability for this event is acceptable. The Technical Specification (Section 3.5.1) Limiting Conditions for Operation (LCO) for an inoperable Division 3 of the ECCS (i.e., HPCS) of 14 days was not exceeded. The LCO was established to allow continued operation with operable diverse or redundant safety equipment for a limited period of time. The operational safety analysis determined the Technical Specification LCOs to be acceptable, and therefore, there is no unacceptable safety significance associated with this condition.

Loss of the safety function of HPCS during the very low period of exposure of a 104°F environment coincident with a degraded grid condition at a time when it would be needed to mitigate the consequences of an accident due to inadvertent tripping of one of the six overloads qualitatively results in a negligible increase in core damage risk. Qualitatively, the probability of ambient temperatures in the area of the overloads exceeding 104°F coincident with degraded grid voltage conditions just above the transfer setpoint coincident with an accident that requires the HPCS to mitigate the consequences of the accident coincident with loss of diverse ECCS safety functions is negligibly higher than with correctly sized overloads.

Similiar Events

LER 84-013 describes an event in which both Post LOCA Hydrogen Recombiner motors (CAC-HR-1A and CAC-HR-1B) tripped on electrical overload within a few minutes of having been placed in initial operation at elevated pressures during normal shutdown conditions for preoperational testing. The overloads and fuses had been sized for 12 HP, the nameplate data of the motors. During initial design review and testing, the difference between nameplate data and design basis requirements was overlooked.

The event in LER 84-013 differs from the event described in this LER in that the overloads in LER 84-013 were selected at the nameplate rating instead of at the design basis requirements. The overloads in MC-4A were selected with the design basis requirements considered, but the selection data was incorrectly applied, which resulted in undersized thermal overloads.

EIIS Information

Text Reference	EIIS Reference	
	System	Component
Diesel Building HVAC (DEA-FN-31)	VJ	BKR
Diesel Building HVAC (DMA-FN-31)	VJ	BKR
Plant AC Distribution System	EA	---
Class 1E Power System	EB	---
Fuel Oil Receiving, Storage, and Transfer System	DE	---
Diesel Oil Fuel System (DO-P-2)	DC	BKR
High Pressure Core Spray (HPCS-P-3)	BG	BKR
Reactor Building HVAC (RRA-FN-4)	VA	BKR
Essential Service Water (SW-V-54, SW-V-4C)	BG	BKR