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 AUTH. NAME AUTHOR AFFILIATION
 ARBUCKLE, J.D. Washington Public Power Supply System
 BAKER, J.W. Washington Public Power Supply System
 RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 92-025-00: on 920522, inoperability of HPCS due to partial failure of upper air deflector in pump motor. Performed visual insp & testing of HPCS pump motor. W/920624 ltr.

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WASHINGTON PUBLIC POWER SUPPLY SYSTEM

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June 24, 1992
G02-92-152

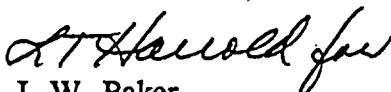
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Washington, D.C. 20555

**SUBJECT: NUCLEAR PLANT WNP-2, OPERATING LICENSE NPF-21
LICENSEE EVENT REPORT NO. 92-025**

Transmitted herewith is Licensee Event Report No. 92-025 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.

Sincerely,



J. W. Baker
WNP-2 Plant Manager (Mail Drop 927M)

JWB/JDA/jd
Enclosure

cc: Mr. J. B. Martin, NRC - Region V
Mr. C. Sorensen, NRC Resident Inspector (Mail Drop 901A, 2 Copies)
INPO Records Center - Atlanta, GA
Mr. D. L. Williams, BPA (Mail Drop 399)

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LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)

Washington Nuclear Plant - Unit 2

DOCKET NUMBER (2)

0 5 0 0 0 3 9 7

PAGE (3)

1 OF 4

TITLE (4)

Inoperability of the High Pressure Core Spray System due to Partial Failure of Upper Air Deflector in Pump Motor - Material Fatigue Failure

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 NUMBERS(S)	
0	5	2	8	9	2	9	2	0	2	5	0	0	0	6	2	4	9	2					0	5	0	0	0

OPERATING MODE (9)

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

POWER LEVEL (10)

0	0	0	20.402(b)	20.405(c)	50.73(a)(2)(iv)	77.71(b)
			20.405(a)(1)(i)	50.36(c)(1)	X 50.73(a)(2)(v)	73.73(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

J. D. Arbuckle, Licensing Engineer

TELEPHONE NUMBER

AREA CODE

5 0 9 3 7 7 - 4 1 4 5

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	B G	H 0 G 0 8 3		Y					

SUPPLEMENTAL REPORT EXPECTED (14)

EXPECTED SUBMISSION DATE (15)

MONTH DAY YEAR
08 20 92

☒ YES (If yes, complete EXPECTED SUBMISSION DATE) ☐ NO

ABSTRACT (16)

On May 22, 1992 during an inspection of High Pressure Core Spray (HPCS) pump motor surge ring support brackets and fasteners, a small piece of the aluminum upper air deflector was found to be lodged inside of the motor stator. In addition, during a followup inspection, several cracks were also discovered in the air deflector. On May 28, 1992, after further investigation, this problem was determined to be reportable because it potentially could have affected the operability of the HPCS System.

The cause of this event is Fatigue Failure due either to maintenance damage traceable to the 1983 time-frame or linear tool marks from the manufacturing process. Because the Plant was already shutdown for the annual maintenance and refueling outage, there was no immediate corrective action taken pertaining to this LER.

Further corrective actions consisted of 1) performing visual inspections and testing of the HPCS pump motor (complete), 2) replacing the failed air deflector with a new deflector (complete), and 3) performing a finite element analysis and fracture mechanics evaluation of the failed air deflector as a further attempt to determine the most probable mode of the fatigue failure (in process).

This event did not affect the health and safety of either the public or Plant personnel.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION															
FACILITY NAME (1)		DOCKET NUMBER (2)							LER NUMBER (8)			PAGE (3)			
Washington Nuclear Plant - Unit 2		0	5	0	0	0	3	9	7	Year	Number	Rev. No.			
										92	025	00	2	OF	4
TITLE (4) Inoperability of the High Pressure Core Spray System due to Partial Failure of Upper Air Deflector in Pump Motor - Material Fatigue Failure															

Plant Conditions

- a) Plant Mode - 5 (Refueling)
- b) Power Level - 0%

Event Description

On May 22, 1992 during an inspection of surge ring support brackets and fasteners on the High Pressure Core Spray (HPCS) System Pump Motor (HPCS-M-P/1), a piece of the aluminum upper air deflector was discovered to be lodged inside of the motor stator. On May 28, 1992, after further investigation, this problem was determined to be reportable because it potentially could have affected the operability of pump HPCS-P-1 and the HPCS System. At the time of the event the Plant was shutdown for the annual maintenance and refueling outage.

The inspection was being performed in response to a recommendation in a General Electric Service Information Letter (SIL 484) pertaining to examination of pump motor surge ring support brackets and fasteners. Although no problems were noted with the brackets and fasteners, the 5-inch by 4-inch (nominally 3/32-inch thick) piece of the deflector that was discovered could have resulted in localized areas of motor damage or there could have been excessive heating of the motor windings due to a reduction of proper air flow during operation of the pump. If the entire annulus portion of the deflector would have failed during pump operation, it most probably would have resulted in motor failure. The purpose of the air deflector is to direct cooling air to the motor windings.

The HPCS pump motor is a 3,000 hp, 1800 RPM, 4140 volt, squirrel-cage induction motor that is mounted vertically above the HPCS pump. The degradation or failure of this pump/motor combination could have affected the safety function of the HPCS System, which is to maintain vessel inventory and cool the reactor core during accident conditions.

Immediate Corrective Action

Because the Plant was already shutdown for the annual maintenance and refueling outage, there was no immediate corrective action taken pertaining to this event.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION											
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Washington Nuclear Plant - Unit 2		0 5 0 0 0 3 9 7					Year	Number	Rev. No.		
							9 2	0 2 5	0 0	3 OF 4	
TITLE (4) Inoperability of the High Pressure Core Spray System due to Partial Failure of Upper Air Deflector in Pump Motor - Material Fatigue Failure											

Further Evaluation and Corrective Action

A. Further Evaluation

1. This event is reportable in accordance with the requirements of 10CFR50.73(a)(2)(v) as any event condition alone that 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 was also verbally reported to the NRC in accordance with the requirements of 10CFR50.72 as a four-hour, nonemergency notification on May 28, 1992.
2. There were no systems, structures or components that were inoperable at the time of the event that contributed to the event.
3. The apparent cause of this event is **Fatigue Failure** of the air deflector material. An examination of the failed deflector was performed by the Supply System Materials Engineering Group and numerous instances of axial cracking were noted which appeared to have propagated due to high frequency, low-load fatigue. The cracks were initiated either as the result of maintenance damage that was traceable to work performed in the 1983 time-frame, or linear tool marks from the manufacturing process (measured to be approximately 50 percent through-wall), or a combination of both.

Accordingly, a finite element analysis and fracture mechanics evaluation are currently being performed as a further attempt to establish the most likely failure mode of the air deflector material.

4. Because the failure of the air deflector could have been caused by a manufacturing defect and the formal 10CFR21 evaluation will not be completed within the 60 day time requirement, this LER also serves as an interim report pursuant to the notification requirements of 10CFR21. Following completion of the finite element analysis and fracture mechanics evaluation, the formal 10CFR21 evaluation will be completed and the results included in a supplemental LER.

B. Further Corrective Action

1. A visual inspection of the motor was performed and it was determined that no damage had occurred to the stator windings. In addition, megger and DC high-potential tests were conducted which confirmed that there were no problems with stator insulation.
2. The failed upper air deflector was replaced with a new deflector. The lower air deflector was visually inspected and no problems were identified.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION							
FACILITY NAME (1) Washington Nuclear Plant - Unit 2		DOCKET NUMBER (2) 0 5 0 0 0 3 9 7			LER NUMBER (8) Year: 9 2 Number: 0 2 5 Rev. No.: 0 0		PAGE (3) 4 OF 4
TITLE (4) Inoperability of the High Pressure Core Spray System due to Partial Failure of Upper Air Deflector in Pump Motor - Material Fatigue Failure							

3. The finite element analysis of the failed air deflector will be completed by July 14, 1992, and the fracture mechanics evaluation will be completed by July 21, 1992.
4. The supplemental LER describing the results of the formal 10CFR21 evaluation will be submitted by August 20, 1992.

Safety Significance

The purpose of the HPCS System is to pump water through a peripheral ring spray sparger into the reactor vessel over a wide range of reactor pressures during accident conditions. For small-break Loss of Coolant Accidents (LOCAs) that do not result in rapid reactor depressurization, the system is designed to maintain reactor water level. For large breaks, the system provides core spray cooling.

However, a failure of the HPCS System is within the bounds of the Emergency Core Cooling System (ECCS) single failure analysis. The ECCS has built-in redundancy and is comprised of the HPCS System, the Low Pressure Core Spray (LPCS) System, the Residual Heat Removal (RHR) System Low Pressure Coolant Injection Mode and the Automatic Depressurization System (ADS).

Furthermore, no condition occurred during the event period that would have required initiation of the ECCS safety function and the RCIC System would also have been available as a backup to the HPCS System in the event a small break had occurred.

Accordingly, this event did not affect the health and safety of either the public or Plant personnel.

Similar Events

There have been LERs written due to the inoperability of the HPCS System, however, none pertaining to the failure of pump motor air deflectors.

EIIS Information

Text Reference

High Pressure Core Spray (HPCS) System
 Motor HPCS-M-P/1
 Pump HPCS-P-1
 ECCS
 Reactor Core Isolation Cooling (RCIC) System
 Low Pressure Core Spray (LPCS) System
 Residual Heat Removal (RHR) System
 Automatic Depressurization System (ADS)

EIIS Reference

<u>System</u>	<u>Component</u>
BG	---
BG	MO
BG	P
BM	---
BN	---
BM	---
BO	---
BG	---