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 RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 92-022-00:on 920514,plant Engineer determined that labyrinth seals installed in replacement CAC blowers were not environmentally qualified.Caused by less work practices & procedures.Counselling of personnel.W/920611 ltr.

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WASHINGTON PUBLIC POWER SUPPLY SYSTEM

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June 11, 1992  
G02-92-141

Docket No. 50-397

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Washington, D. C. 20555

**SUBJECT: NUCLEAR PLANT WNP-2, OPERATING LICENSE NPF-21  
LICENSEE EVENT REPORT NO. 92-022**

Transmitted herewith is Licensee Event Report No. 92-022 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)

Enclosure

cc: Mr. John 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 5

TITLE (4).

REPLACEMENT CONTAINMENT ATMOSPHERE CONTROL SYSTEM BLOWERS INSTALLED WITH UNQUALIFIED SEALS

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	1	4	9	2	9	2	0	2	2	0	0		
0	5	1	4	9	2	9	2	0	6	1	1	9		
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)			20.402(b)			20.405(C)			50.73(a)(2)(iv)			77.71(b)		
0			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	TELEPHONE NUMBER
C. L. Fies, Compliance Engineer	AREA CODE
	5 0 9 3 7 7 - 4 1 4 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) ☒ NO

ABSTRACT (16)

On May 14, 1992, a Plant Procurement Engineer determined the labyrinth seals installed in the replacement Containment Atmosphere Control (CAC) Blowers (CAC-FN-1A/B) were not environmentally qualified. A TFE Teflon seal installed on the blower shafts could deteriorate when exposed to high radiation leading to degraded blower performance.

The root cause of this event was less than adequate work practices and procedures.

Corrective actions being taken include counseling of Procurement Engineering personnel on this failure, ways to prevent recurrence and a review of procedures for adequacy of requirements.

We believe this event has only minor safety significance even though the operability of both divisions of one of the WNP-2 Engineered Safety Features was impacted. Blower performance and catalyst bed efficiency could have been somewhat lessened by this event.

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   Number   Rev. No. 9   2   0   2   2   0   0			PAGE (3) 2   OF   5			
TITLE (4) REPLACEMENT CONTAINMENT ATMOSPHERE CONTROL SYSTEM BLOWERS INSTALLED WITH UNQUALIFIED SEALS														

### Plant Conditions

Power Level - 0%  
Plant Mode - 5

### Event Description

On May 14, 1992, a Plant Procurement Engineer determined the labyrinth seals installed in the replacement Containment Atmosphere Control (CAC) Blowers (CAC-FN-1A/B) were not environmentally qualified. The replacement blowers were found to contain a labyrinth seal which contained TFE Teflon. This Teflon material is qualified to  $10^5$  rads of gamma radiation. The post accident environment inside the blower is calculated to be  $1.2 \times 10^7$  rads gamma and  $6 \times 10^8$  rads beta.

The CAC System includes redundant catalytic recombiners provided to combine the hydrogen and oxygen in the Primary Containment during degraded post-LOCA conditions. The recombiner subsystems (A and B) are located adjacent to the Primary Containment in the Reactor Building (Secondary Containment). Each redundant subsystem consists of a blower, wet scrubber, electric heater, catalyst vessel, after cooler, moisture separator and associated instrumentation, valves and piping. Constant speed blowers are used to draw the atmosphere from the Primary Containment, process it through the equipment and return it back to the Containment.

The blowers are straight, two-lobe, rotary compressor (Roots Blowers) of conventional design. They have a rated compression ratio of 2:1, have rated rotational speeds up to 3500 RPM and suction and discharge ports sized to fit a three inch threaded pipe. Complete failure of the Teflon in the four seals in each blower would have reduced the flow capacity of the system.

### Immediate Corrective Actions

No immediate corrective action was taken as the plant was in a refueling outage when the event was discovered and the CAC System is not required in modes 3, 4, and 5.

### Further Evaluation and Corrective Action

#### A. Further Evaluation

1. This event is reportable per 10CFR50.73(a)(2)(v) as an "....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." It was also reported under 10CFR50.72(b)(2)(iii)(D) as a four hour verbal nonemergency event.

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TITLE (4) REPLACEMENT CONTAINMENT ATMOSPHERE CONTROL SYSTEM BLOWERS INSTALLED WITH UNQUALIFIED SEALS							

2. There were no other structures, components, or systems inoperable prior to the event which contributed to the event.
3. In September 1991 a replacement blower was needed immediately to support plant startup since CAC-FN-1A was found in a seized condition as described in LER 91-025. When attempts were made to purchase a new blower it was determined that the model needed was no longer in production. The company that had manufactured the original blower (Schwitzer) had been sold to another company (Duroflow, a Division of Cooper Industries). Schwitzer had modified the design of the blower prior to transfer of the business to Duroflow. Among other things, the design had been modified to provide a more positive seal for the rotary shafts by installing a Teflon labyrinth seal between the end of the rotor and the oil seal. The seal configuration on the original blower consisted primarily of a close tolerance fit bushing. The air vent section was larger and was equipped with a breather cap. On the newer design the installation of a "labyrinth" seal reduces the leakage and the air vent section was reduced in size and was vented on the bottom of the blower. At WNP-2 the blowers are mounted in a container that is an extension of the primary containment. Thus, the vented air is returned to the suction of the blower. The first replacement blower was installed (Work Request AR5533) on September 8 and declared operable on September 19, 1991.
4. Procurement Evaluation Revision Record 3790, Revision 0, dated September 9, 1991, did note that the ".....airbox ring seal has been replaced by a more effective labyrinth seal arrangement..." No evaluation of the environmental qualification of the new labyrinth seal material was performed at that time because it was assumed the material of construction of the new seal was identical to the old. Substitution Evaluation 1227 Revision 0, dated October 8, 1991, approved the replacement of the original Schwitzer Model 184677 with a Duroflow Model GGBBAAA rotary blower. The substitution evaluation addresses changes in the housing construction and inlet/outlet connections of the blower but failed to identify or adequately address changes in the seal material.
5. The only way the presence of the nonmetallic seal could have been properly addressed was by a review of the vendors detailed materials information. Unfortunately, their drawing does not define the seal in sufficient detail to have detected this change and the necessary information needed for the evaluation was not requested.
6. On April 2, 1992, after the second replacement CAC blower was installed in the plant, Maintenance Engineering discovered the existing blower rebuild kits did not contain all the seals required for the new blowers and they ordered new rebuild kits. During the procurement evaluation associated with the reordering process Procurement Engineering discovered that the material in the seals was Teflon.

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7. Further evaluations were performed to determine the type of Teflon used in the new labyrinth seals. EFTE or PCTFE types of Teflon would have met environmental requirements. On May 14, 1992, it was determined that the seals contained TFE Teflon which was not a satisfactory material.
8. The root cause of this event was less than adequate work practices and procedures. Procurement Engineering failed to perform an adequate review of the seal material even though it was apparent a change had been made because it was assumed the seal was metallic. Work practice requirements for performing substitution evaluations included in SPES-1, Procurement Engineering Manual, require assurance that Equipment Qualification issues are adequately addressed to assure acceptability. In this case the requirements were not met by the preparer or the reviewers. Procurement Engineering procedures did not force an adequate review of this safety related equipment located in the Containment environment.

**B. Further Corrective Action**

1. A complete evaluation will be performed of the new CAC blowers to assure they meet all environmental qualification requirements. This will be completed prior to June 30, 1992.
2. Personnel in Procurement Engineering have been instructed on this failure and ways to prevent recurrence.
3. The requirements of SPES-1 will be reviewed to assure proper guidance is contained regarding the need to a) address nonmetallic parts, b) address all changes to equipment design and configuration for potential impact, and c) review of vendor product information and/or drawings to assure all changes are addressed whenever possible. This will be completed by September 1, 1992.
4. Both CAC blowers will be modified (Plant Modification Record PMR 92-0162) to correct problems with the labyrinth seals. This will be completed prior to June 30, 1992.

**Safety Significance**

We believe this event has only minor safety significance even though the operability of both divisions of one of the WNP-2 Engineered Safety Features was impacted and there was a potential for somewhat lessened performance of the system.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION					
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The Teflon in the labyrinth seals could harden and suffer mechanical breakdown if exposed to high levels of radiation and the rotating shaft during degraded LOCA conditions. The Teflon material would not interfere with the operation of the blower during or after this deterioration as the material would most likely be pulverized and be vented from the blower. The blower is upstream of the heater and catalyst bed. Thus, the pulverized Teflon could possibly migrate to this unit and be exposed to elevated temperatures. Since TFE Teflon is composed of linked CF<sub>2</sub> units, high temperatures could cause a breakdown to the carbon and fluorine structure. This could impact the efficiency of the catalyst bed but it is doubtful this would be significant given the small amount of Teflon involved.

The labyrinth seals, if failed, would allow gas to pass from the positive pressure side of the blower rotors to the outside of the blower casing. This is effectively the blower inlet chamber since the blowers are located in a structure that is considered an extension of containment. The metal portion of the seal has an approximate 1/32 inch clearance from the 1-5/8 inch diameter shaft sleeve. Half of the circumference of the seal is exposed to the high pressure side of the rotors and the other half is exposed to the suction pressure. As a result there would be some decrease in blower performance.

### Similar Events

There were no similar events involving environmental qualification of CAC equipment. LER 86-037 discusses the installation of an environmentally unqualified acoustic monitor connector which involved a substitution evaluation. Substitution evaluation procedures were upgraded at that time. Had the procedures been followed, it is believed this event would not have occurred. However, the procedures are being reviewed for possible areas of improvement.

### EIIS Information

#### Text Reference

Containment Atmosphere Control System  
Hydrogen Recombiner Blower (CAC-FN-1A,  
CAC-FN-1B)

#### EIIS Reference

<u>System</u>	<u>Component</u>
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BB	
BB	BL0