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SUBJECT: LER 92-028-00:on 920617,DGs declared inoperable due to plant equipment design deficiency.TS Action Statement 3.8.1.2 was entered which suspends core alterations.W/920717 ltr.

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WASHINGTON PUBLIC POWER SUPPLY SYSTEM

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

July 17, 1992
G02-92-172

Docket No. 50-397

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

SUBJECT: NUCLEAR PLANT WNP-2, OPERATING LICENSE NPF-21
LICENSEE EVENT REPORT NO. 92-028

Transmitted herewith is Licensee Event Report No. 92-028 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,

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

JWB/PLP/jrd
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)	DOCKET NUMBER (2)	PAGE (3)
Washington Nuclear Plant - Unit 2	0 5 0 0 0 3 9 7	1 OF 8

TITLE (4)
DIESEL ROOM NORMAL AIR HANDLING FANS DO NOT AUTOMATICALLY RESTART AFTER LOOP

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 6	1 7	9 2	9 2	-- 0 2 8	-- 0 0	0 7	1 7	9 2		0 5 0 0 0
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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)
5	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
P. L. Powell, Compliance Engineer	AREA CODE 5 0 9 3 7 7 - 4 2 8 1

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 (16)

On June 17, 1992, Supply System personnel determined that the control configuration of the Diesel Generator (DG) room normal air handling fans DMA-FN-12, 22, and 32 precluded performance of the required design function; i.e., returning to service following a loss-of-offsite-power (LOOP). Subsequent degraded room cooling could potentially cause safety related equipment to be affected by high ambient temperature. Under these conditions, long term DG operability could not be assured. Because all three DGs have the same control configuration and LOOP response requirement, the DGs were declared inoperable.

The root cause of this event was plant equipment design deficiency in that the original Architect/Engineer design of the fan control circuitry did not provide for automatic restart post LOOP.

Immediate corrective actions were taken to minimize the impact of this condition by providing direction to ensure that the fans would be manually restarted following a LOOP event, a staffed position was identified as responsible for ensuring that the fan was restarted and appropriate training was provided to those staffing the position.

(Continued on next page)

ABSTRACT (Continued)

During a follow on review of all safety related fan response to a LOOP two additional fans were identified that were required to, but did not return to service post LOOP. These fans, WMA-FN-52A and B, provide cooling to the cable spreading and remote shutdown rooms and cable chase areas. Degraded cooling in these areas could potentially cause safety related equipment to be adversely affected by high ambient temperature. Further, returning WMA-FN-52A to service under LOOP conditions could potentially overload DG-1 and adversely impact the LOOP overall response.

The event posed no threat to the health and safety of either the public or plant personnel because operator actions on an auto start of the DGs assures the timely restart of both the DMA and WMA fans. Hence, the probability of long term degradation of equipment due to inadequate room cooling was not significant. Further, the addition of WMA-FN-52A to the DG-1 load is compensated by the design of the DG HVAC room heaters. An operating DG naturally adds heat to the room and, by design, the heaters are deenergized at 78°F. Hence the load returns to below the continuous design load rating of the DG. The duration of time that both heaters and WMA fan might be carried simultaneously is insignificant compared to the 2000 hour design rating load (4650KW) of the DGs.

Plant Conditions

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

Event Description

On June 17, 1992, Supply System personnel determined that the control configuration of the DG room normal air handling fans DMA-FN-12, 22, and 32 precluded performance of a required design function; i.e., restarting automatically to assist in DG room cooling, following a LOOP event.

A Supply System review of the existing DG HVAC room temperature calculation, initiated in response to a recent Electrical Distribution System Functional Inspection report, discovered this deficiency. Because all three DGs have the same HVAC control configuration and LOOP response requirement, the DGs were declared inoperable. Verbal notification was made to the NRC on June 17, 1992.

Immediate Corrective Action

Technical Specification Action Statement 3.8.1.2 was entered which suspends core alterations, handling of irradiated fuel in the secondary containment, operations with a potential for draining the reactor vessel and crane operations over the spent fuel storage pool. None of these evolutions were in progress at the time of discovering the deficiency.

Immediate direction was provided to the operators to ensure that the affected fans were manually restarted in the event of a LOOP. Further, a continuously staffed position, separate from the control room operators, was identified as responsible for this action and training was provided to ensure timely restart of the affected fans until a design modification was implemented.

With implementation of the above compensatory actions and discussion with the NRC, the DGs were declared operable for Modes 4 and 5. Accordingly, Technical Specification Action Statement 3.8.1.2 was exited at approximately 1800 (PDT) June 17, 1992.

Further Evaluation and Corrective Action

A. Further Evaluation

1. This event is considered reportable per 10CFR50.73(a)(2)(v) as a condition that alone could have prevented the fulfillment of a safety function.

   The DMA fans (DMA-FN-12, 22, 32) are normally in operation and trip upon a LOOP. The design intent was that in response to a LOOP the start of the associated DG would start standby room cooling exhaust fan (DEA-FN-11, 21, 31) and supply fan (DMA-FN-11, 21, 31 also normally in standby) and restart the tripped DMA fans (DMA-FN-12, 22, 32) thus providing cooling to the associated DG room. Left uncorrected this condition had the potential for causing safety related equipment in the DG room to be adversely affected due to the resultant high ambient room temperature. Hence, with potentially degraded room cooling the DGs were declared inoperable and verbal notification to the NRC was made per 10CFR 50.72 (b)(2)(iii) on June 17, 1992. The follow on discovery of the WMA fans was verbally reported on July 9, 1992.

2. The root cause of both DMA and WMA fans failing to auto start post LOOP is **Plant Equipment Design Deficiency.** A review of the original system design has shown that both DMA and WMA fan circuitry were never provided an automatic restart capability. Also, plant design documents did not reflect an auto start capability. With deficient design documentation any review of the system without consideration of the heat loads and cooling requirements in the room would not have recognized the deficiency. Further, plant procedures and activities based on the design documentation alone would have continued to propagate this deficiency as shown in the example below.

3. Further evaluation of the surveillance test procedure for confirming operability of the DGs during LOOP conditions has identified a situation warranting attention. Upon the DG start under LOOP conditions, the test procedure directs those conducting the test to "Initiate log readings as soon after the start as possible and hourly thereafter". The log lists the normal condition for DMA-FN-12, 22, 32 as "RUNNING". As reported above the as built configuration precludes DMA-FN-12, 22 or 32 from being automatically energized under post LOOP conditions. Hence it must be concluded that the individual initially completing the log readings has been encountering the DMA fan in an "OFF" condition and manually restarting the fan.

   The procedure, with only a statement that the fan be "RUNNING", does not provide sufficient guidance or emphasis to those conducting the test that the condition of the fan not running is off normal. Without this emphasis, the expected response is to start the fan manually. Hence compliance to the Supply System policy and guidance to document off normal conditions for investigation and potential corrective action was subverted by the lack of specificity in the procedure.

   Hence inadequate design documentation, as discussed in paragraph A.2 above, and procedure inadequacy are not the total causes for failing to correct this situation. The off normal condition; a fan in "OFF" that is annotated in a procedure as "running" should elicit an inquiry from the individuals conducting the test despite the procedure not emphasizing the correct status. Management guidance and Supply System policy expects that personnel react to off normal conditions by documenting the condition for evaluation and potential corrective action. In this manner, the DMA fan deficiency could have been identified earlier. A combination of inadequate design documentation, procedural inadequacy and acceptance of an off normal condition contributed to failing to recognize and correct this deficiency.

4. A review of the conditions encountered to date with regard to DG room temperatures under post LOOP conditions has not identified a trend towards increasing temperatures. With the fan being restarted manually within one hour as stated in paragraph A.3 above, degraded cooling conditions were not being observed. Additionally, DMA-FN-12, 22 and 32 are small capacity units (20,000 SCFM) compared to the standby exhaust and supply units (56,000 and 36,000 CFM respectively). Hence some cooling is supplied by the exhaust fan pulling air through the air handling units that would normally be supplied from DMA-FN-12, 22, or 32. In this manner some cooling is provided through the air handling unit despite the supply fan being deenergized. A trend of increasing temperatures has not been observed.

   These two conditions, either singly or together, may have contributed towards minimizing the impact of the deenergized DMA fans on DG room temperature during post LOOP conditions.

5. A follow on review of all safety related fan response to a LOOP event identified two fans, WMA-FN-52A and B, that are required to, but did not automatically return to power post LOOP. These fans provide cooling to the cable spreading and remote shutdown rooms and cable chase area. The fans are redundant with either fan capable of meeting the design cooling requirements for these areas. Review of the heat loads and equipment in these areas has concluded that without cooling being reestablished within a reasonable time period safety related equipment operability could be impaired.

   In contrast to the opportunity to discover the DMA-FN-12, 22, and 32 lack of auto restart condition, WMA-FN-52A and B are not described in LOOP test procedures as normally "RUNNING". Hence there is no expected status provided to compare with the as found condition of the fan. There is an alarm on increased temperatures in the cable spreading room and a trouble alarm for the HVAC system that identifies a loss of power to the fan. These alarms are not seismically qualified but would be available to the operator under LOOP test conditions. The associated procedure for power loss directs that the redundant fan be started and power be returned to the deenergized fan as soon as possible. The high temperature alarm procedure directs that the ventilation to the area be checked. Both procedures would return the WMA fans to service within a reasonable time. Additionally hourly tours through these areas would note the increasing temperatures. As a result corrective actions would be commenced far before ambient conditions in the areas threatened the long term operability qualification of the equipment in the area.

6. During the root cause analysis of this event it was also discovered that DEA-FN-12, 22, and 32, (the DG fuel oil day-tank room exhaust fans) also did not return to service post LOOP as intended by design. A review of original design documents has lead to the same root cause as for the DMA and WMA fans. However a review of the analysis of the heat loads in this area has determined that cooling in this area post LOOP was not necessary to support the plant response to the LOOP.

7. There were no structures, components or systems that were inoperable prior to the start of this event which contributed to the event.

B. Corrective Action Taken

1. An urgent Plant Modification Request (PMR) was completed prior to completion of the refueling outage which modified the starting circuitry so that the DMA fans automatically start post LOOP upon bus energization by the associated DG. Because this modification satisfies the design requirement, the starting directions to the operators and the trained, continuously staffed position responsible for starting the DMA fans are no longer necessary. The PMR also corrected the design documentation for the DMA fans.

2. For the WMA fans procedures have been modified to direct the operators to restart the fans post LOOP. For WMA-FN-52A, heaters to the DG-1 room HVAC system have been tagged out to compensate for the additional load represented by WMA-FN-52A.

3. An Engineering evaluation has been performed on all HVAC fans that are required to be operating post LOOP to determine if a design deficiency similar to that found on DMA-FN-12, 22, and 32 exists. This evaluation resulted in the discovery of WMA-FN-52A and 52B discussed in paragraph A.5 above.

C. Further Corrective Action

1. The LOOP test procedure will be revised to include verification that necessary support systems are returned to service upon bus energization. This action is to be completed by March 1, 1993.

2. For the WMA fans a Technical Evaluation Request (TER) has been initiated to evaluate modifying the control circuitry to auto start the fans post LOOP. This evaluation is scheduled for completion by September 1, 1992.

3. The DG-1 loading calculation will be reevaluated prior to September 1, 1992, to justify adding the tagged out DG-1 room HVAC system heaters prior to environmental conditions warranting the need for the heaters. The heaters are needed to maintain minimum temperatures in the DG-1 room. Presently there is no need for the heaters because summer weather conditions preclude the need for heaters in the DG HVAC system to maintain minimum temperatures.

4. Management will reiterate to appropriate Plant personnel the necessity of recognizing off normal conditions and documenting them for evaluation and corrective action. This action is to be completed by September 1, 1992.

Safety Significance

On an auto start of the DGs plant procedures direct the Operator to commence taking hourly log readings of various DG and room cooling parameters. Because the log describes the DMA fans as running, the Operator manually starts the fan. As a result, the fan has been returned to service during the hourly log readings. Degraded room cooling conditions have not been observed. With hourly readings required it is not credible that the DMA fans could have remained in "off" for an extended period of time.

Further, under post LOOP conditions DMA-FN-12, 22, 32 (20,000 CFM each) and standby DMA-FN-11, 21, 31 (36,000 CFM each) were to be operating as supply fans with standby DEA-FN-11, 21, 31 (56,000 CFM each) as an exhaust fan. Because DMA-FN-12, 22, 32 were not returning to service, post LOOP testing, a mismatch in flow in the DG rooms existed prior to the operator manually starting the affected fan. The mismatch in flow volume resulted in flow being pulled through the air handling unit associated with the deenergized DMA fan. Because the air handling unit is lined up for operation with correct damper positions and cooling water supply, air cooling is still provided through the unit.

With the operator directed to commence log taking and subsequently starting the affected fan and the cooling provided by the flow mismatch, degraded cooling conditions in the DG rooms have not been observed.

Room temperature conditions are controlled to limit the potential for long term degradation of equipment in the rooms. Accelerated aging and equipment failure is thereby avoided. Because long term degraded cooling conditions are not credible due to both the hourly logs ensuring that the DMA fan is restarted and the cooling provided by the flow mismatch, a long term impact due to high ambient temperatures is not credible. Therefore, this condition is considered to have had negligible safety significance.

The safety significance of the WMA fans not returning to power post LOOP is minimal. The areas cooled by these fans have routinely been and are on an hourly fire tour. The individual conducting the tour would have noted any increasing temperatures long before the ambient conditions reach a magnitude capable of threatening the long term operability qualification of the equipment in the areas. As a result corrective actions would have been taken to investigate the cause and return the fan to service. Hence normal operator actions would have precluded the degraded cooling (WMA fans not returning to service) from jeopardizing the operability of the equipment in the area.

Further, although not seismically qualified, two alarms are provided to alert the operator that an abnormal condition exists with respect to cooling in the cable spreading and remote shutdown rooms and cable chase area. A "CABLE RM HVAC DIV. 1 (2) OUT OF SERVICE" alarm alerts the operator that HVAC to these areas has malfunctioned. The cable spreading room has redundant temperature alarms that alert the operator that temperatures in the room have exceeded 90°F. The "CABLE RM HVAC DIV. 1 (2) OUT OF SERVICE" alarm procedure will lead to another alarm panel that states "WMA-FN-52A Pwr Loss" and procedures direct that the alternate fan be started and power restored to the deenergized fan as soon as possible. The cable spreading room temperature alarm will cause investigation as to the cause of the increased temperature and directs that ventilation for the room be checked. Either alarm will cause cooling to be restored in a timely manner. In summary, the normal fire tour would have noted the increased temperatures and commenced corrective actions or the alarms, if available, would have alerted the operator to restore cooling. As such a long term impact due to high ambient temperatures is not credible.

The impact of returning the WMA fans to service also has minimal safety significance. Each fan is rated at 12.9KW. The WMA-FN-52B load has been considered in the loading calculations for DG-2 hence returning it to service has no impact. The increased load of WMA-FN-52A on DG-1 had not been considered. With addition of WMA-FN-52A to DG-1 the continuous load design rating of 4400KW would be exceeded. However the 2000 hour load design rating of 4650KW is not jeopardized. A DG start will increase room temperatures to the point at which the DR room HVAC heaters atomically deenergize (78°F). The heaters are a 35KW load. Hence deenergization of the heaters provides margin in the load to accommodate the WMA fan load (12.9KW). The load on DG-1 is then below the continuous load design rating. The duration of time that both heaters and WMA fan might be energized simultaneously is not significant in comparison to the 2000 hour load design rating (4650KW). Therefore returning WMA-FAN-52A to service under post LOOP conditions has minimal safety significance.

Similar Events

There are no similar events in which a common mode design deficiency in HVAC systems caused the safety related equipment in the spaces to be declared inoperable.

EIIS Information

Text Reference	EIIS Reference System	EIIS Reference Component
Diesel Generator HVAC	VJ	---
Diesel Generators	EK	DG
DG Mixing Air Handling Fans (DMA-FN-12,22 and 23)	VJ	FAN
Secondary Containment	NH	---
Spent Fuel Storage Pool	DA	---
DG Room Exhaust Fans (DEA-FN-11, 21, 31)	VJ	FAN
DG Room Air Handing Fans (DMA-FN-11, 21, 31)	VJ	FAN
Radwaste Mixing Air Handling Fans (WMA-FN-52A and 52B)	VJ	FAN