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 BAKER,J.W. Washington Public Power Supply System
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SUBJECT: LER 90-020-00:on 900917,util determined overheating of
 control cabinet could cause diesel generator failure.

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NCR No. 290-

Docket No. 50-397

G02-90-176

October 17, 1990

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

Subject: NUCLEAR PLANT NO. 2
LICENSEE EVENT REPORT NO. 90-020

Dear Sir:

Transmitted herewith is Licensee Event Report No. 90-020 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,

9010260175 901017
PDR ADOCK 05000397
S PNU

J. W. Baker (M/D 927M)
WNP-2 Plant Manager

JWB:lr

Enclosure:
Licensee Event Report No. 90-020

cc: Mr. John B. Martin, NRC - Region V
Mr. C. Sorensen, NRC Resident Inspector (M/D 901A)
INPO Records Center - Atlanta, GA
Ms. Dottie Sherman, ANI
Mr. D. L. Williams, BPA (M/D 399)
NRC Resident Inspector - walk over copy

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AUTHOR:	SL Washington	FOR SIGNATURE OF:	JW Baker
SECTION			
FOR APPROVAL OF	RL Koenigs	LT Harrold	
APPROVED			
DATE	10/17/90	10-17-90	

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

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

G02-90-176

Docket No. 50-397

October 17, 1990

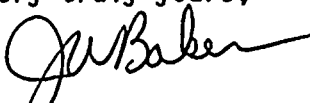
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J. W. Baker (M/D 927M)
WNP-2 Plant Manager

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LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH 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.

FACILITY NAME (1)
Washington Nuclear Plant - Unit 2

DOCKET NUMBER (2)
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PAGE (3)
1 OF 0 5

TITLE (4) OVERHEATING OF CONTROL CABINET INTERNAL COMPONENTS COULD CAUSE DIESEL GENERATOR FAILURE DUE TO INADEQUATE DESIGN AND PROGRAMMATIC CONTROLS

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)	
0 9	1 7	9 0	9 0	0 2	0 0	1 0	1 7	9 0			0 5 0 0 0	
OPERATING MODE (9) 1			THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)									
POWER LEVEL (10) 9, 7			20.402(b)			20.405(c)			50.73(a)(2)(iv)			73.71(b)
			20.405(a)(1)(i)			50.38(c)(1)			50.73(a)(2)(v)			73.71(c)
			20.405(a)(1)(ii)			50.38(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)(ii)			50.73(a)(2)(viii)(A)			
			20.405(a)(1)(iv)			50.73(a)(2)(iii)			50.73(a)(2)(viii)(B)			
			20.405(a)(1)(v)			50.73(a)(2)(iii)			50.73(a)(2)(ix)			

LICENSEE CONTACT FOR THIS LER (12)

NAME
S. L. Washington, Compliance Supervisor

TELEPHONE NUMBER
AREA CODE
5 0 9 3 7 7 - 2 0 8 0

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDOS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDOS

SUPPLEMENTAL REPORT EXPECTED (14)

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

EXPECTED SUBMISSION DATE (15)

MONTH DAY YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On September 17, 1990 it was determined by Plant Engineers that a single condition, overheating in the Diesel Generator Excitation Control Cabinets, could prevent the Division 1 and 2 Diesel Generators (DG1 and DG2) from fulfilling their safety function. During worst case design conditions, the DG electrical equipment room would reach its design temperature of 104°F. It was determined by Plant tests that operation of the DGs, coincident with a 104°F room temperature would cause the temperature in the DG Excitation Control Cabinet to stabilize at 136°F. The Static Excitor Voltage Regulator (SEVR) manufacturer's recommended continuous operation (operation exceeding 24 hours) temperature is 122°F. Thus, for these conditions, operability of the SEVR is not assured and, since the SEVR controls the voltage and field of the generator, the operability of the DG also cannot be guaranteed. In November 1989, while re-evaluating the DG room heatup under design basis accident conditions, it was determined by Supply System Engineers that there was insufficient data to determine the heatup characteristics of the DG Excitation Control Cabinets. Temperature tests were then initiated to obtain the necessary data to complete the re-evaluation. Immediate corrective action was to modify applicable Plant procedures to include instructions to remove the DG Excitation Control Cabinet doors within 24 hours when the local DG electrical equipment room temperature exceeds 90°F during operation of the respective DG. The causes of this event are a manufacturing error in that the cabinets supplied with the DGs did

1. The first part of the report is a summary of the work done during the year. It is a brief statement of the results of the work, and is intended to give a general impression of the progress made.

2. The second part of the report is a detailed account of the work done during the year. It is a full and complete statement of the results of the work, and is intended to give a detailed impression of the progress made.

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10. The tenth part of the report is a detailed account of the work done during the year. It is a full and complete statement of the results of the work, and is intended to give a detailed impression of the progress made.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH 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.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
Washington Nuclear Plant - Unit 2	0 5 0 0 0 3 9 7	9 0	- 0 2 0	- 0 0	0 2	OF	0 5

TEXT (If more space is required, use additional NRC Form 366A's) (17)

not have any cooling capability, and an error in the Supply System Startup Program which failed to verify that a Supply System modification to the cabinets would meet all operability requirements. Further corrective action includes performing reviews to determine if other Plant safety related cabinets have a similar heat-up problem, and to determine if further modifications to the DG Excitation Control Cabinets can be made to minimize operator actions following an accident.

Plant Conditions

Power Level - 97%
Plant Mode - 1

Event Description

On September 17, 1990 it was determined by Plant Engineers that a single condition, overheating in the Diesel Generator (DG) Excitation Control Cabinets, could prevent the Division 1 and 2 Diesel Generators (DG1 and DG2) from fulfilling their safety function. During worst case design conditions, the DG electrical equipment room would reach its design temperature of 104°F. It was determined by Plant tests that operation of the DGs, coincident with a 104°F room temperature, would cause the temperature in the DG Excitation Control Cabinet to stabilize at 136°F. The Static Excitor Voltage Regulator (SEVR) manufacturer's recommended temperature for continuous operation (operation exceeding 24 hours) is 122°F. Therefore, during conditions where the DG electrical room temperature is 104°F and the DG is in continuous operation mode (more than 24 hours), the operability of the SEVR cannot be assured. Furthermore, because the SEVR controls the voltage and field of the generator, the operability of the DG also cannot be guaranteed during these conditions.

In November 1989, Supply System Engineers were re-evaluating the DG room heatup under design basis accident conditions with more recent diesel heat load data. During the re-evaluation it was determined that there was insufficient data to determine the heatup characteristics of the DG Excitation Control Cabinets. Accordingly, temperature tests were then initiated to obtain this data.

Temperature tests performed in July 1990 in accordance with Plant Temporary Procedure TP 8.3.162 on the control cabinets (E-CP- REP1, E-CP-REP2) for DG-1 and DG-2, at the normal ambient room temperature of 68°F, indicated the panel peak internal temperature rise was approximately 32°F. This test data was later evaluated and resulted in the September 17, 1990 conclusion that the maximum DG electrical equipment room temperature for continuous operation is 90°F.

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Immediate Corrective Action

Applicable Plant procedures were deviated to include instructions to remove the DG Excitation Control Cabinet doors within 24 hours when the local DG electrical equipment room temperature exceeds 90°F during operation of the respective DG.

Further Evaluation and Corrective Action

A. Further Evaluation

1. This event is reportable per 10CFR50.72(b)(2)(iii) and 10CFR50.73(a)(2)(v) as a single condition alone that could have prevented the fulfillment of the safety functions of DG-1 and DG-2 to shutdown the reactor and maintain it in a safe shutdown condition, remove residual heat, control the release of radioactive material, and mitigate the consequences of an accident. On September 17, 1990 at 1549 hours, the Nuclear Regulatory Commission was notified in accordance with 10 CFR 50.72(b)(2)(iii).

This event was evaluated as not reportable under 10CFR, Part 21, because the Supply System previously reported this condition under the requirements of 10CFR50.55(e). [Reference Supply System Letter G02-83-924, C. S. Carlisle(SS) to J. B. Martin(NRC) "10CFR50.55(e) Reportable Condition #290 DG Exciter Control Cabinet Overheating", dated October 14, 1983.]

2. There were no structures, components, or systems inoperable prior to discovery of the condition which contributed to the condition.
3. The primary root causes of this event were 1) the cabinet design by Stewart&Stevenson Services, Inc. (DG1 and DG2 supplier), was less than specified to provide necessary cooling of internal components at the peak design ambient room temperature, and 2) the Supply System management programs for work practices were less than adequate to ensure that permanent modifications to the DG Excitation Control Cabinet made during Plant startup in 1983 adequately covered all design conditions.
 - a. During Plant startup testing in 1983, the SEVRs failed to operate within performance specifications because of overheating when temperatures in the cabinets exceeded the manufacturer's recommended short-time temperature limit of 158°F. This occurred at ambient room temperatures of approximately 75°F.

The DG electrical equipment room design maximum ambient temperature is 104°F (106°F in the Diesel Generator Contract 2808-53). Based on this design information, the SEVR vendor (a sub-supplier to



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Stewart & Stevenson Services, Inc.) sized static power heat sinks and selected various electronic components to allow the SEVR to be rated for continuous operation at 122°F. The SEVR vendor provided a caution in the instruction manual for the equipment ... "The (SEVR) ... is a heat producing device and must not be installed where there is no ventilation." Modifications were then made by the Supply System to the cabinets which allowed for free air convection cooling of the internal components. Thus, the original cabinet design was less than specified.

- b. Identification of the cabinet design deficiency to provide adequate cooling of the internal components during startup testing resulted in modifications to the cabinet by the Supply System. The modifications consisted of installing ventilation chimneys and louvered vents to promote convection cooling. These modifications allowed startup testing to continue. However, no subsequent thermal tests and analyses were performed to determine the new temperature rise in the DG Excitation Control Cabinet due to internal components(SEVR) and the acceptability of that temperature rise under design basis conditions. Consequently, work practices were less than adequate to ensure that all design criteria were satisfied prior to placing equipment important to safety into operation.
- c. An evaluation of the DG Excitation Control Cabinet thermal test results by Supply System Engineers indicate that with a 32°F temperature rise and the maximum continuous operating temperature for the SEVRs of 122°F, the maximum room ambient temperature allowable without additional cabinet ventilation is 90°F. It was further determined that removal of the DG Excitation Control Cabinet doors would provide adequate cooling of the SEVR at ambient temperatures above 90°F and up to the design maximum ambient room temperature of 104°F.

B. Further Corrective Action

1. A review will be performed to determine if further modifications of the DG Excitation Control Cabinets are appropriate to minimize operator actions following an accident.
2. A review will be performed to determine if similar heat-up characteristics exist in other safety-related cabinets.

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Safety Significance

There is minimal safety significance associated with this event. Because the SEVRs are designed to operate short term (24 hours or less) at 158°F, the DGs would be operable for the initial stages of any event. In addition, the probability of the combination events required (loss of all offsite power requiring an extended DG run and DG electrical equipment room temperatures above 90°F) is considered low. Furthermore, the High Pressure Core Spray System DG (HPCS) would still be available. The HPCS is powered from an independent Diesel Generator which was supplied by a different vendor and was made by a different manufacturer. This DG has been designated as the Plant alternate AC source for Station Blackout. Since no event actually occurred, this situation posed no threat to the health and safety of either the public or Plant personnel.

Similar Events

None

EIIS InformationText ReferenceEIIS Reference

	<u>System</u>	<u>Component</u>
Diesel Generator (DG) Excitation Control Cabinet(s) (E-CP-REP1 and E-CP-REP2)	EK	CAB
Diesel Generator (DG1 and DG2)	EK	DG
DG Electrical Equipment Room	NB	--
Static Excitor Voltage Regulator (SEVR(s)) Generator	EK	90
High Pressure Core Spray System (HPCS) DG	EK	DG

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12. The twelfth part is a summary of the work done during the year, and a list of the names of the persons who have been employed during the year.

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