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 FACIL:50-397 WPPSS Nuclear Project, Unit 2, Washington Public Powe 05000397
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7/23/90

SUBJECT: LER 89-010-01:on 890501,partial NSSSS actuation due to loss
 of power to RPS Bus A - cause equipment design deficiency.
 W/9 ltr.

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 TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

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WASHINGTON PUBLIC POWER SUPPLY SYSTEM

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

Docket No. 50-397

July 23, 1990

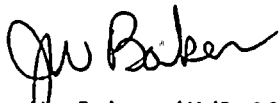
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Washington, D.C. 20555

Subject: NUCLEAR PLANT NO. 2
LICENSEE EVENT REPORT NO. 89-010, Rev. 1

Dear Sir:

Transmitted herewith is Licensee Event Report No. 89-010-01 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. This is a duplicate of the original which was mailed to you on December 5, 1989. Page 3 of 5 was accidentally omitted.

Very truly yours,



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

JWB:lr

Enclosure:
Licensee Event Report No. 89-010, Rev. 1

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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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) 0 5 0 0 0 3 9 7 1				PAGE (3) 1 OF 0 5										
TITLE (4) Partial Nuclear Steam Supply Shutoff System Actuation Due to Loss of Power to Reactor Protective System Bus "A" - Cause - Equipment Design Deficiency																								
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	5	0	1	8	9	8	9	0	1	0	0	1	1	2	0	5	8	9	0	5	0	0	0	0
OPERATING MODE (9)		4		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)				73.71(b)								
				20.405(a)(1)(i)				50.36(c)(1)				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)(ix)												
LICENSEE CONTACT FOR THIS LER (12)																								
NAME W.S. Davison, Compliance Engineer										TELEPHONE NUMBER 5 0 9 3 7 7 - 2 5 0 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		E X 1. 2 7 2 6												
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)

During shutdown conditions for the annual refueling outage, power was lost to the "A" Reactor Protective System (RPS) 120 volt instrument bus on two occasions, causing ESF actuations in the form of primary and secondary containment isolations. The first occurrence was May 1, 1989, at 2146 hours and the second occurrence was May 3, 1989, at 1528 hours. The first event was characterized by a momentary (less than 100 milli-second) loss of 120 volt AC power to the bus with attendant actuation of Primary Containment isolation groups 2,5,6, and 7. The second event differed in that the bus suffered a sustained loss of 120 volt AC power which caused not only a group 2,5,6, and 7 Primary Containment but a Secondary Containment isolation as well.

The cause of the event was a metal nameplate falling into the RPS bus "A" power supply circuitry resulting in a short circuit to ground. The short circuit caused power supply transients. Corrective actions consisted of: Prompt action by the plant operators to return the Residual Heat Removal Shutdown Cooling System to operation to restore cooling to the reactor and the recovery of other systems as needed in accordance with plant procedures. Troubleshooting was implemented to discover the cause of the power loss. All nameplates were removed from the "A" side RPS power supply panels. The nameplates on the "B" side RPS power supply panel will be removed during the 1990 Refueling Outage.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 500 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) 0 5 0 0 0 3 9 1 7	LER NUMBER (6)			PAGE (3)		
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		8 9	0 1 1 0	0 1 1	0 2	OF	0 5

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

Since all ESF systems responded as designed, these two events had no safety significance. This event presented no safety hazard to the public or Plant personnel.

Plant Conditions

- a) Power Level - 0%
- b) Plant Mode - 4 (Cold Shutdown)

Event Description

During the annual refueling outage, on May 1, 1989, at 2146 hours, while performing the Reactor Protective System (RPS) Logic System Functional Test, the "A" RPS 120 volt AC power supply bus experienced an unexplained momentary loss of electrical power. As a result of this electrical transient which lasted less than 100 milli-seconds, Primary Containment Isolation groups 2,5,6, and 7 received a spurious ESF actuation signal causing the closure of the following valves: RHR-V-53A (Shutdown Cooling Loop "A" Return Valve), RHR-V-53B (Shutdown Cooling Loop "B" Return Valve), RHR-V-8 (Shutdown Cooling Loop "A" Suction Containment Isolation Valve), RHR-V-23 (Shutdown Cooling Head Spray Valve), RHR-V-40 (Loop "B" Outboard Isolation to Radwaste), RHR-V-75A (Loop "A" Outboard Sample Isolation Valve), RHR-V-75B (Loop "B" Outboard Sample Isolation Valve), MS-V-67D (Main Steam Isolation Valve MS-V-28D body drain isolation to the Main Condenser) [All other body drain isolation valves were closed as a result of the shutdown.], EDR-V-20 (Drywell Equipment Drains Containment Isolation Outboard Valve), FDR-V-4 (Drywell Floor Drain Containment Isolation Outboard Valve), and RWCU-V-4 (Reactor Water Cleanup System Outboard Suction Isolation Valve).

Also, one half of the RPS trip logic was actuated, causing operation of half of the scram pilot solenoid valves (a half scram on the "A" side), and one half of the Main Steam Isolation Valve (MSIV) isolation logic (a half MSIV isolation) was actuated. Neither the half scram nor the half MSIV isolation resulted in actual equipment operation as these are circuit logic conditions only.

On May 3, 1989, at 1528 hours, a second similar loss of power to the "A" RPS bus occurred. The difference between this event and the previous occurrence on May 1, 1989, was the fact that the Electrical Protection Assemblies (EPAs), located on the output side of the "A" RPS Motor Generator Set, did actuate to deenergize the 120 volt "A" RPS bus. This resulted in a sustained loss of power to the bus causing spurious initiation of a Reactor Building Exhaust Plenum High Radiation signal ("Z" signal) and the subsequent initiation of a Secondary Containment Isolation signal in addition to the ESF actuations caused by the previous event.

As a result of the spurious "Z" signal the following actions occurred:

- o Auto start of both Standby Gas Treatment trains.

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FACILITY NAME (1) Washington Nuclear Plant - Unit 2	DOCKET NUMBER (2) 0 5 0 0 0 3 9 7	LER NUMBER (6)			PAGE (3)		
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TEXT (If more space is required, use additional NRC Form 366A's) (17)

- o Auto start of the Technical Support Center Standby HVAC units.
- o Auto start of the Reactor Building emergency room coolers.
- o Actuation of Reactor Building lighting quench.
- o Isolation of Reactor Building Equipment and Floor Drain systems sump pump discharge header isolation.

As a result of the Secondary Containment Isolation signal, the secondary containment ventilation system isolated and Reactor Building supply and exhaust fans tripped.

Immediate Corrective Action

During the event on May 1, 1989, plant operators responded by halting testing activity and implementing the direction given in the Abnormal Condition Operating Procedures to respond to the loss of the "A" RPS 120 AC volt bus. The major impact of this event was the loss of RHR Shutdown Cooling to the Reactor. The plant operators responded to restore cooling rapidly and without incident within 21 minutes of event initiation. At the time of initiation of the second event, no Logic System Functional Tests were in progress. Plant operators again responded in accordance with the Abnormal Condition Operating Procedures to recover RHR Shutdown Cooling within 36 minutes of event initiation and return the remainder of the affected plant systems to service as required.

Further Evaluation and Corrective ActionA. Further Evaluation

1. This event is being reported per the requirements of 10CFR50.73(a)(2)(iv) as an "event or condition that resulted in manual or automatic actuation of any Engineered Safety Feature (ESF), including the Reactor Protective System (RPS).
2. There were no structures, components or systems that were inoperable at the start of this event that contributed to the event.
3. Since the time duration of the first power loss on May 1, 1989, was less than 100 milli-seconds, the Electrical Protection Assemblies (EPAs) on the output side of the "A" RPS Motor Generator set did not have time to sense the occurrence and trip. As a result of this fact, the "A" RPS MG Set remained connected to the bus and restored power before some of the electronic power supplies could react to the transient. Thus, the second event during which the EPAs did trip to provide a sustained power loss, differs from the first due to the initiation of a "Z" signal and its associated actuations.

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

4. The cause of the event was discovered to be Equipment Failure - Design Deficiency - Problem Not Anticipated:

As a result of troubleshooting efforts, a metal nameplate was found in the bottom of the RPS "A" power panel. The nameplate showed signs of arc damage. Investigation indicates that the nameplate had been lodged between the upper pole piece of the RPS "A" logic feeder circuit breaker and the power panel inner metal cover causing the RPS power supply to short circuit to ground. It was concluded that the direct short to ground caused bus voltage to drop enough to result in the observed power supply transients.

It was further concluded that the glue which attached the nameplate to the upper section of the power panel was degraded by heat in a manner unanticipated by the designer. The degradation of the glue allowed the nameplate to fall off into the circuit breaker area and cause the short to ground.

B. Corrective Action

1. A troubleshooting plan was written and implemented to discover the cause of the unexplained losses of the "A" RPS bus power supply.
2. The nameplates were removed from the "A" RPS power supply panel.
3. The nameplates on the "B" side RPS power supply panel will be removed during the 1990 Refueling Outage.

Safety Significance

Since all of the ESF systems responded as designed to the spurious actuation signals, these two events had no safety significance. The loss of RHR Shutdown Cooling was responded to in a correct and timely fashion to return cooling and circulation to the reactor core within the Technical Specification time limits. Had these events occurred with the plant operating at power, some of the systems would have been subjected to thermal, flow and pressure transients of greater magnitude. This type of local system transient is within the scope of the design of the various systems and would have presented no safety concern. This event presented no safety hazard to the public or Plant personnel.

Similar Events

Two previous similar events have occurred at WNP-2. LER 85-025-01 "Engineered Safety Feature Isolations and Actuations Caused by Reactor Protection System Equipment Failure" documented a loss of the "A" RPS bus which was attributed to failure of the EPA circuit breaker RPS-EPA-3A undervoltage relay coil. LER 86-011-00 "Nuclear Steam Supply Shutoff System Actuation due to Momentary Loss of Instrument Power" documented a momentary loss of power to the "B" RPS bus. The cause of this event was not able to be determined.

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

EIIS InformationText ReferenceEIIS Reference

System Component

RPS.	JC	---
EPA	JC	---
"A" RPS Motor Generator Set	JC	88
RHK-V-53A	BO	V
RHR-V-53B	BO	V
RHR-V-40	BO	V
RHR-V-75A	BO	V
RHR-V-75B	BO	V
MS-V-67D	SB	V
MS-V-28B	SB	V
EDR-V-20	WH	V
FDR-V-4	WH	V
MSIV	SB	V
Standby Gas Treatment	BH	---
Technical Support Center HVAC	VK	---
Reactor Building Emergency Room Coolers	VA	HX
Reactor Building Equipment and Floor Drain Sump Pump Header	WH	PSF
Secondary Containment Ventilation System	VA	---
Reactor Building Supply and Exhaust Fans	VA	P
RHR Shutdown Cooling	BO	---
RWCU-V-4	CE	V
"A" RPS Power Supply Panel	JC	RJX
"B" RPS Power Supply Panel	JC	RJX