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 RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 89-023-00: on 890531, ESF isolations & actuations due to
 loss of reactor protection sys bus during testing. W/8 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

June 30, 1989

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

Subject: NUCLEAR PLANT NO. 2
LICENSEE EVENT REPORT NO. 89-023

Dear Sir:

Transmitted herewith is Licensee Event Report No. 89-023 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,



C.M. Rowers (M/D 927M)
WNP-2 Plant Manager

CMP:lg

Enclosure:
Licensee Event Report No. 89-023

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)

FACILITY NAME (1) Washington Nuclear Plant - Unit 2	DOCKET NUMBER (2) 0 5 0 0 0 3 9 7	PAGE (3) 1 OF 0 6
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TITLE (4) Engineered Safety Feature (ESF) Isolations and Actuations Due to Loss of Reactor Protection System (RPS) Bus During Testing - Personnel Error/Procedural Inadequacy
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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	3	1	8	9	8	9	0	2	3	0	6	3	0	8	9	0	5	0	0	0

OPERATING MODE (9) 5		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)	X	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)(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)		TELEPHONE NUMBER	
NAME	AREA CODE		
J.D. Arbuckle, Compliance Engineer	510	937 171-1211 5	

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)											
CAUSE	SYSTEM	COMPONENT	MANUFAC. TURER	REPORTABLE TO NRPDS		CAUSE	SYSTEM	COMPONENT	MANUFAC. TURER	REPORTABLE TO NRPDS	

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)

On May 31, 1989 at 1406 hours an Electrical Protection Assembly (EPA) Breaker (RPS-EPA-3E) tripped causing a loss of power to Reactor Protection System (RPS) Bus B. Loss of power to RPS Bus B caused a half-scam in RPS Division B and multiple primary and secondary containment isolations and Engineered Safety Feature (ESF) actuations of ventilation systems. At the time of the event the Plant was shutdown for the annual maintenance and refueling outage.

The loss of RPS B power causes Nuclear Steam Supply Shutoff System (NSSSS) Containment Inboard and Outboard Isolations for Groups 1,2,5,6 and 7; and a Reactor Building Exhaust Plenum Radiation Monitor "Z" signal [a non-NSSSS ESF signal] which initiates several ESF actuations including the Standby Gas Treatment (SGT) System, the Control Room Emergency Filtration System, and a Reactor Building Ventilation System isolation. Plant Operators responded by restoring all systems, including Residual Heat Removal (RHR) Shutdown Cooling, to pre-event lineup status by 1430 hours.

The causes of this event are 1) personnel error in that a Plant Test Engineer and Plant Operators did not adequately review the consequences of starting a Reactor Recirculation Pump (RRC-P-1A) while the plant was aligned for the performance of Logic System Functional Testing (LSFT) of the ATWS Recirculation Pump "A" Trip System, and 2) inadequate procedure in that the LSFT procedure did not specifically caution against starting an RRC pump during test performance. The LSFT alignment requires lifting a lead in the logic circuitry for the 60 Hz power supply to RRC-P-1A. The lifted lead defeated the normal pump starting sequence (60 cycle start power automatically shifting to a 15

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES: 8/31/88

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

Abstract (continued)

cycle source). With the lead lifted, the down shift sequence could not occur and the pump remained at 60 Hz until plant operators tripped the pump from the control room. The large load starting and remaining on 60 Hz power longer than normal caused under voltage transients on the power supply of sufficient magnitude to trip the EPA breaker and cause the actuations and isolations.

Corrective actions consist of counselling the individual involved, revising the LSFT procedure to indicate the consequences of lifted leads, and performing an evaluation of those ESF actuations which have occurred during the recent maintenance and refueling outage.

There is no safety significance associated with this event. No actual plant conditions requiring the Engineered Safety Feature isolations and actuations existed, and all isolations and actuations occurred as designed.

Plant Conditions

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

Event Description

On May 31, 1989 at 1406 hours an Electrical Protection Assembly (EPA) breaker (RPS-EPA-3E) tripped causing a loss of power to Reactor Protection System (RPS) Bus B. The loss of power on RPS Bus B caused a half-scam in RPS Division B and multiple primary and secondary containment isolations and Engineered Safety Feature (ESF) actuations of ventilation systems. At the time of the event the Plant was in a shutdown condition for the annual maintenance and refueling outage.

The loss of RPS Bus B power causes Nuclear Steam Supply Shutoff System (NSSSS) Containment Inboard and Outboard Isolations for Groups 1 (Main Steam Line Drain Valves only), Group 2 (Reactor Water Sample Valves), Group 5 [Residual Heat Removal (RHR) and Traversing In-Core Probe (TIP) Systems], Group 6 (RHR Shutdown Cooling), and Group 7 [Reactor Water Cleanup (RWCU) System]. At the time of the event, both the TIP and RWCU Systems were already out of service for maintenance.

In addition, the loss of RPS B power causes an NSSSS Group 3 (Primary and Secondary Containment Ventilation and Purge System) and partial Group 4 [Miscellaneous Balance of Plant (6-Valves)] isolation. These isolations occurred because RPS Bus B is the power supply for Reactor Building Exhaust Plenum Radiation Monitors (Channels B and D). Loss of RPS B power de-energizes these monitors, causing a "Z" signal - a non-NSSSS ESF trip signal. All required Group 3 and 4 actions occurred as designed, including the automatic start of the Standby Gas Treatment (SGT) System and the Control Room Emergency Filtration System, and a Reactor Building HVAC Isolation.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

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TEXT (If more space is required, use additional NRC Form 368A's) (17)

Prior to the event, RPS Bus B supply power had been transferred to the alternate power supply and RPS Motor-Generator MG-1B was secured for maintenance. Flywheel energy in the RPS MG sets normally protects the RPS buses from voltage and frequency transients in the plant power supply system. The alternate power supply is fed directly from the plant power supply system and does not offer the same protective feature.

At the time of the event, Logic System Functional Testing (LSFT) of the ATWS Recirculation Pump A (RRC-P-1A) Trip System was in progress with a Plant Test Engineer supervising the test in the control room. As part of the alignment for the LSFT, leads in the logic trip circuitry to the RRC-P-1A Dual Trip Breaker (RRC-CB-P1A/RPT3) were lifted. In the Reactor Recirculation Pump starting sequence, 60 Hz power is supplied through breaker RPT-3A until 95% full pump RPM is reached. Normally at that time, breaker RPT-3A trips automatically and the pump coasts down. At approximately 25% pump RPM, Output Breaker RPT-2A (supplying 15 Hz power) should close and satisfy the pump starting logic sequence to run the pump at low speed. However, due to the lifted leads, the RPT-3A trip function was defeated. As a result, RRC-P-1A started and subsequently failed to trip at 95% RPM. The pump remained on 60 Hz power supply long enough to allow an undervoltage condition to be sensed by EPA Breaker RPS-EPA-3E which tripped by design, de-energized RPS Bus B, and caused the actuations and isolations.

However, it should be noted that at the time of the event, alternate power was being supplied through Station Normal Transformer TR-N2. It is recognized from procedures and training that starting large loads is not advised while on RPS alternate power when fed from Startup Transformer TR-S due to resultant power supply transients and the effect on alternate power. There is also a high probability that the same effects could be expected to occur when being on alternate power and fed from TR-N2. As a result, this event probably would have occurred regardless of those actions taken to defeat the RRC-P-1A logic trip circuitry. This was demonstrated later the same day (at 2242 hours) when the RPS "B" alternate power supply tripped during an RRC pump start without testing in progress or interruption of the pump start sequence. This did not result in an unplanned ESF actuation because Plant Operators had pre-staged system lineups in anticipation of a loss of RPS Bus B due to the event earlier in the day.

Immediate Corrective Action

Plant Operators, on recognizing a failed auto start sequence for RRC-P-1A, manually tripped the pump from the control room. By 1413 hours RPS alternate power had been restored to RPS Bus B and the RPS half scram was reset at 1419 hours. At 1424 hours Reactor Building Ventilation was returned to normal and the Standby Gas Treatment "B" System was secured. Pump RHR-P-2B was started at 1430 hours and all systems were then in their pre-event lineup status.

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TEXT (If more space is required, use additional NRC Form 368A's) (17)

Further Evaluation and Corrective ActionA. Further Evaluation

1. This event is reportable under 10CFR 50.73(a)(2)(iv) as "an event or condition that resulted in manual or automatic actuation of any Engineered Safety Feature (ESF), including the Reactor Protection System (RPS)."
2. Had RPS-MG-1B been available and powering RPS Bus B, flywheel energy in the MG set would have carried the bus through the voltage transient and precluded the event. Alternate power was being supplied through Station Normal Transformer TR-N2 and Startup Transformer TR-S was out of service for maintenance. There were no other structures, components, or systems that were inoperable at the start of the event that contributed to the event.
3. The root causes of this event are as follows:
 - a) Personnel Error: Both the Test Engineer and Control Room Operators failed to fully investigate and understand the impact of starting RRC-P-1A while the plant was aligned for the LSFT. Had the implications of lifting the lead been recognized the plant operators would not have attempted to start the pump.
 - b) Procedural Inadequacy: When asked by the Control Room Operators if RRC-P-1A could be started, the Test Engineer reviewed the LSFT procedure for precautions applicable to the situation and found no explicit precautions. The procedure did state that the "system being tested shall be out of service during the performance of that portion of the test" but the Test Engineer believed that this referred only to the trip of RRC-P-1A on an ATWS signal and did not consider it to mean a loss of high speed trip function on starting the pump. As a result, the Test Engineer determined that a pump start was not prohibited and advised the Control Room Operators to proceed with the RRC pump start.

B. Further Corrective Action

1. The Test Engineer involved was counseled on the importance of fully understanding the implications of test line-ups prior to providing guidance on the advisability of plant operations.
2. Logic System Functional Test procedures are being revised to indicate the consequences of lifted leads and installed jumpers. In the case of the ATWS Recirculation Pump Trip System LSFT, this change has been made.
3. Guidance has been provided to Plant Operations from Plant Technical on restricting the manipulations of large electrical loads while on RPS alternate power.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

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4. Applicable Plant operating procedures will be reviewed to consider the necessity to provide precautions against starting large loads whenever the RPS Alternate Power Supply is being utilized.
5. An overall evaluation is currently being performed for those ESF actuations which have occurred during the recent maintenance and refueling outage. As part of this evaluation, changes to the design of the alternate power supply will be considered to make the power supply less susceptible to voltage or frequency transients.

Safety Significance

There is no safety significance associated with this event because no Plant condition requiring the ESF isolations and actuations existed, and all ESF acutations occurred as designed.

In addition, at the time of the event reactor water level was greater than 22 feet above the reactor vessel flange with the fuel pool gate removed which provided a large heat sink for core cooling. Plant Operators responded by restoring all systems, including RHR Shutdown Cooling, to pre-event lineup status within 24 minutes.

Accordingly, this event posed no threat to the health and safety of either the public or Plant personnel.

Similar Events

None

EIIS InformationText ReferenceEIIS Reference

EPA Breaker (RPS-EPA-3E)
Reactor Protection System (RPS)
RPS-Bus-B
Nuclear Steam Supply Shutoff System (NSSSS)
Reactor Building Exhaust Plenum Radiation Monitor
Standby Gas Treatment (SGT) System
Control Room Emergency Filtration System
Reactor Building HVAC
Residual Heat Removal (RHR) System
Reactor Recirculation Pump (RRC-P-1A)
Main Steam Line Drain Valves

System	Component
JC	BKR
JC	---
JC	BU
BD	---
IL	MON
BH	---
VH	---
VA	---
BD	---
AD	P
SN	LOV

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

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EIIS InformationText ReferenceEIIS Reference

System Component

Reactor Water Sample Valves
Traversing In-Core Probe (TIP) System
Reactor Water Cleanup (RWCU) System
Containment Ventilation and Purge System
RPS MG Set (RPS-MG-1B)
Breaker RRC-CB-PIA/RPT3 (RPT-3A)
Breaker RPT-2A
Transformer TR-N2
Transformer TR-S

AD ISV
IG ---
CE ---
VH ---
JC MG
AD BKR
AD BKR
EA XFMR
EA XFMR