

# CATEGORY 1

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 FACIL: 50-397 WPPSS Nuclear Project, Unit 2, Washington Public Powe      05000397  
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 RECIP. NAME      RECIPIENT AFFILIATION

SUBJECT: LER 98-003-00: on 980311, WNP-2 experienced SCRAM signal as  
 result of low RPV. Caused by less than post-SCRAM operational  
 strategy for resetting SCRAM signal in conditions. Changes in  
 post-SCRAM operational strategy implemented. W/980409 ltr.

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WASHINGTON PUBLIC POWER SUPPLY SYSTEM

P.O. Box 968 • Richland, Washington 99352-0968

April 9, 1998  
GO2-98-067

Docket No. 50-397

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

Gentlemen:

Subject: **NUCLEAR PLANT WNP-2, OPERATING LICENSE NPF-21,  
LICENSEE EVENT REPORT NO. 98-003-00**

Transmitted herewith is Licensee Event Report No. 98-003-00 for WNP-2. This report is submitted pursuant to 10 CFR 50.73 and discusses the items of reportability, corrective action taken, and action to preclude recurrence.

Should you have any questions or desire additional information regarding this matter, please call me or Mr. Paul Inserra at (509) 377-4147.

Respectfully,

  
P. R. Bemis

Vice President, Nuclear Operations  
Mail Drop PE23

Enclosure

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# LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) <b>Washington Nuclear Plant - Unit 2</b>	DOCKET NUMBER (2) <b>50-397</b>	PAGE (3) <b>1 OF 4</b>
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TITLE (4) **Reactor SCRAM While Shutdown Due to Vessel Low Level**

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV. NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
03	11	98	98	003	00	04	09	98	N/A	

OPERATING MODE	3	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)								
POWER	0	20.402(b)	20.405(c)	X	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				
		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 <b>Bill Pfitzer, Licensing Engineer</b>	TELEPHONE NUMBER (Include Area Code) <b>509-377-2419</b>

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)										
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

SUPPLEMENTAL REPORT EXPECTED (14)				EXPECTED	MONTH	DAY	YEAR
YES (If yes, completed EXPECTED SUBMISSION DATE).		NO					

**ABSTRACT:** At 0607 on March 11, 1998, with the plant shutdown in Mode 3, WNP-2 experienced a SCRAM signal as a result of low RPV level (+13 inches). This SCRAM occurred after an initial plant SCRAM which took place during power operation. The initial SCRAM and resultant Engineered Safety Feature (ESF) actuations are the subject of LER 98-002.

At the time the second SCRAM occurred all main steam isolation valves (MSIVs) were closed, and the operating crew was controlling Reactor Pressure Vessel (RPV) pressure between 900 and 1000 psig by intermittent manual operation of main steam relief valves (MSRVs), and controlling RPV level by manual operation of the Reactor Core Isolation Cooling (RCIC) system. In consideration of the possibility of thermal stratification in the lower RPV head area, at about 42 minutes into the event the Control Room Supervisor (CRS) directed the initial SCRAM to be reset to minimize the contribution of cooler water from the Control Rod Drive (CRD) system into the RPV lower head area. At approximately 51 minutes into the event, closure of an MSRV after an RPV pressure reduction to approximately 900 psig, caused vessel level to shrink to less than +13 inches (to approximately +11.5 inches), a condition which resulted in the second automatic SCRAM signal.

The root cause was concluded to be a less than optimal post-SCRAM operational strategy for resetting the SCRAM signal in these conditions. Changes in post-SCRAM operational strategy will be implemented in plant procedures. The safety consequences of this event are minimal.

**LICENSEE EVENT REPORT (LER)**  
**TEXT CONTINUATION**

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Washington Nuclear Plant - Unit 2	50-397	98	003	00	2 OF 4

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

**Event Description**

At 0607 on March 11, 1998, with the plant shutdown in Mode 3, WNP-2 experienced a SCRAM signal as a result of low RPV level (+13 inches). This SCRAM occurred approximately 51 minutes after an initial plant SCRAM which took place during power operation. The initial SCRAM and resultant Engineered Safety Feature actuations are the subject of LER 98-002.

At the time the second SCRAM occurred, all MSIVs [ISV] were closed, and the operating crew was controlling RPV pressure between 900 and 1000 psig by intermittent manual operation of MSRVs [RV], and controlling RPV level by manual operation of the RCIC [BN] system. Also, as a result of the low RPV level condition (-50 inches) experienced after the initial SCRAM, the Reactor Recirculation (RRC)[AD] pumps were tripped and the Reactor Water Cleanup (RWCU)[CE] system was isolated. Without these systems operating, the RPV had no forced circulation in the lower head area. This lack of forced circulation, coupled with the admission of cool water into the lower RPV head area by the Control Rod Drive (CRD)[AA] system, can result in thermal stratification in the lower head area. In consideration of this condition, at about 42 minutes into the event, the CRS directed the SCRAM be reset to minimize the contribution of water from the CRD system and thereby limit thermal stratification. Approximately 9 minutes later, as a result of manual operation of an MSRV for RPV pressure control, a second reactor SCRAM occurred due to RPV low level at +13 inches.

Operation of an MSRV with the RPV pressurized causes sensed RPV level to "swell" when the relief valve is opened, and causes sensed RPV level to "shrink" when the relief valve is again closed. On this occasion, the opening of the MSRV caused RPV level to swell to +54.5 inches, a condition which caused automatic closure of the RCIC steam supply valve and termination of RCIC flow to the RPV. Before the operating crew could reset the RCIC system, closure of the open relief valve at approximately 900 psig caused vessel level to shrink to less than +13 inches (to approximately +11.5 inches), a condition which resulted in the second automatic SCRAM signal.

RPV pressure control was continued by manual operation of MSRVs, and RPV level control was re-established using the RCIC system. The second SCRAM was subsequently reset, and emergency operating procedures entered as a result of the initial event were exited. After successful re-opening of the MSIVs, the RPV was depressurized per normal plant operating procedures using main condenser turbine by-pass valves.

The second SCRAM was reported as an actuation of the Reactor Protection System within 4 hours as required by 10CFR50.72.

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Immediate Corrective Action

A Problem Evaluation Request was written to address the inadvertent SCRAM.

Further Evaluation

The decision of the CRS to reset the initial SCRAM under these conditions was appropriate per existing procedural guidance. The plant procedure for SCRAM recovery requires verification that RPV level is stable prior to resetting the SCRAM. The operating crew had successfully controlled RPV level at greater than +13 inches by manual operation of the RCIC system concurrent with cycling of MSRVs since 11 minutes after the initial SCRAM; a period of approximately 30 minutes. Therefore, since the crew was successfully maintaining RPV level above +13 inches, the CRS appropriately directed resetting of the SCRAM to minimize thermal stratification in the lower RPV head area.

Further investigation and discussions with Operations management regarding this operational strategy have resulted in proposed changes to the timing of resetting the SCRAM, and possible alternate methods for minimizing CRD flow into the lower RPV head area.

Cause of Event

Although the operating crew maintained RPV level at greater than +13 inches for approximately 30 minutes, the plant dynamics of cycling relief valves for RPV pressure control while maintaining RPV level between +13 and +54.5 inches eventually led to level swings resulting in the SCRAM. The coordination required to maintain this level control band is unnecessarily challenging during the conditions experienced in this transient, i.e., high decay heat and MSIVs closed. Due to these plant dynamics, the root cause was concluded to be a less than optimal post-SCRAM operational strategy, in that other methods of minimizing CRD flow to the lower RPV head area were not addressed. The existing operational strategy, as reflected in the procedures, allows only the option of SCRAM reset to minimize CRD flow and thus limit thermal stratification into the lower RPV head area.

A contributing cause to this event was failure to take corrective actions from previous similar occurrences to prevent recurrence. Corrective actions from previous similar events have concentrated on attempting to improve the coordination and control of MSRV operation and RCIC level control during isolated conditions through procedure guidance or simulator exposure. Currently the simulator does not accurately model the RPV level shrink/swell phenomenon during MSRV operation. Efforts to improve simulator modeling of the shrink/swell phenomenon will continue.

**LICENSEE EVENT REPORT (LER)**  
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Further Corrective Action

Procedure changes will be implemented to allow alternate methods for minimization of post-SCRAM CRD flow to then lower RPV head area which do not necessitate resetting the SCRAM.

The WNP-2 simulator will be upgraded to more accurately model the observed pressure-induced RPV level fluctuations, and operating crews will be trained using the upgraded model.

Assessment of Safety Consequences

The safety consequences of this event are minimal. At the time of the event, the reactor was shutdown and all control rods were inserted prior to the SCRAM signal. Therefore, the event posed no threat to the safety of the public or plant personnel.

Similar Events

LER 91-32 reported a reactor scram that resulted from a main turbine trip. RPV level 2 ECCS actuations occurred at -50 inches and RPV level was restored and eventually peaked at +77 inches. With the MSIVs closed control room operators maintained RPV pressure/level control with MSRVs and RCIC. While attempting to maintain level, MSRV cycling caused RPV level to drop to +11 inches resulting in a reactor SCRAM.

LER 97-005 documents a similar event during preparations for MSRV testing following a SCRAM. The MSIVs were closed to maintain RPV pressure, with RCIC controlling RPV level. When a relief valve was closed the associated RPV level shrink resulted in level going below the scram setpoint.