

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) PALISADES NUCLEAR PLANT	DOCKET NUMBER (2) 0 5 0 0 0 2 5 5	PAGE (3) 1 OF 0 4
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TITLE (4)
Reactor Trip Set Less Than Technical Specification Limit

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)
1	1	0 9 8 4	8 4	0 2 3	0 1	0 2	0 7	8 5	NA		0 5 0 0 0
									NA		0 5 0 0 0

OPERATING MODE (9) N	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)			20.406(c)			80.73(a)(2)(iv)			73.71(b)	
	20.406(a)(1)(i)			80.38(a)(1)			<input checked="" type="checkbox"/> 80.73(a)(2)(v)			73.71(c)	
	20.406(a)(1)(ii)			80.38(c)(2)			<input checked="" type="checkbox"/> 80.73(a)(2)(vi)			OTHER (Specify in Abstract below and in Text, NRC Form 306A)	
	20.406(a)(1)(iii)			<input checked="" type="checkbox"/> 80.73(a)(2)(ii)			80.73(a)(2)(vii)(A)				
	20.406(a)(1)(iv)			<input checked="" type="checkbox"/> 80.73(a)(2)(iii)			80.73(a)(2)(vii)(B)				
20.406(a)(1)(v)			80.73(a)(2)(iii)			80.73(a)(2)(x)					

LICENSEE CONTACT FOR THIS LER (12)

NAME David W. Rogers; Technical Engineer - Palisades	TELEPHONE NUMBER
	AREA CODE: 6 1 6 NUMBER: 7 6 4 - 8 9 1 3

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)

<input checked="" type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)	<input type="checkbox"/> NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
			0 3	0 1	8 5

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

On November 9, 1984, with the Plant in cold shutdown, the Reactor Protection System (RPS) low primary coolant flow trip for four (4) primary coolant pumps (PCP) operation was determined to be set incorrectly. On December 13, 1984, subsequent evaluation of the four-pump trip setting revealed that the RPS low primary coolant flow trip for three (3) PCP operations was also not set correctly. In addition, the evaluation has shown that the three-pump low-flow-trip setpoint is calculated by incorrect methods. As a result, a Technical Specification safety system setpoint limit was exceeded during previous plant operations.

The incorrect trip settings occurred when a low-flow-trip calibration procedure was not performed and resulted in incorrect values in an RPS surveillance procedure. The incorrect calculation method was originated with the controlling procedure and resulted from a misunderstanding of primary coolant flow characteristics.

The calibration procedure was subsequently performed and the correct four-pump low-flow-trip values were provided for the surveillance procedure. The calibration procedure requirements will be included in the RPS surveillance procedure. The three-pump low-flow trip has been reset and will result in a trip for any three-pump flow configuration.

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TEXT (If more space is required, use additional NRC Form 306A's) (17)

On November 9, 1984, with the plant in cold shutdown, the Reactor Protection System (JC) low primary coolant flow trip was determined to be set incorrectly for four primary coolant pumps (AB;P) operation. Technical Specification Table 2.3.1, Item 2 requires the four-pump low-flow-trip setpoint to be greater than or equal to 95 percent of the nominal four-pump primary coolant flow. During the operating period from July 1984 to September 1984, the trip value did not meet this criteria.

On December 13, 1984, subsequent engineering evaluation revealed that the Reactor Protection System low primary coolant flow trip for three primary coolant pump operation was also not set correctly. In addition, it was determined that the procedural method for calculating the trip setpoint results in a value that does not meet Technical Specification limits for three-pump operation. Technical Specification Table 2.3.1, Item 2, requires the three-pump low-flow-trip setpoint to be greater than or equal to 71 percent of the nominal four-pump primary coolant flow. The exact date of occurrence of the calculation error cannot be determined, but is believed to have occurred in the early 1970's. In recent operation, a three-pump condition occurred on September 16, 1984 (reference Licensee Event Report 84-021, dated October 31, 1984), as a result of a primary coolant pump seal (AB;SEAL) failure.

The Reactor Protection System (RPS) low-flow-trip consists of four independent channels. Each channel utilizes a separate set of differential pressure (dp) detectors (JC;PDT). Flow in each of the four coolant loops is determined by a measurement of pressure drop from inlet to outlet of the steam generators (AB;SG). The total flow through the reactor core is measured by summing the loop pressure drops across the steam generators and correlating the pressure sum with the pump calibration flow curves. A reactor trip is initiated by two-out-of-four coincidence logic from any of the four independent measuring channels when the flow function falls below a preselected value. Pretrip alarms are initiated if the coolant flow function approaches the minimum required for reactor operation at the corresponding power level. The low-flow-trip setpoint is manually changed for the selected pump configuration by means of a setpoint selector switch.

Test Procedure T-69, "RPS Low Flow Trip Calibration," is used to determine the correlation between steam generator dp and total coolant flow. T-69 also determines the correct dp values for the low-flow-trip. These values are then used in Technical Specification Surveillance Procedure MI-2, "Reactor Protection Trip Units," to set or verify the low-flow-trip such that it occurs at the setpoint calculated in T-69. Test Procedure T-69 is performed to incorporate changes in steam generator dp that do not correlate to flow changes. In particular, items such as steam generator tube plugging would be considered.

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FACILITY NAME (1) PALIADES NUCLEAR PLANT	DOCKET NUMBER (2) 0500025584	LER NUMBER (6)			PAGE (3)	
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		84	023	01	03	OF 04

TEXT (If more space is required, use additional NRC Form 308A's) (17)

Test Procedure T-69 was required to be performed in December 1981 during the plant startup following the 1981 refueling outage. A scheduling error by the plant support staff omitted this test. In addition, Surveillance Procedure MI-2 did not reference T-69 to ensure the correct trip values were available. As a result, the low primary coolant flow trip settings were not updated to account for steam generator dp changes that resulted from tube plugging.

An analysis was performed to determine the operating periods affected by the error in the low-flow-trip setpoint. The analysis has shown that the four-pump low-flow-trip setpoint was within Technical Specification limits, except for the period of operation from July 1984 to September 1984. During the period, all four low-flow-trip setpoints were found to be less than the required minimum value of 95 percent. Using conservative calculations, the greatest error was determined to have been a setpoint of 94.37 percent. It is estimated, based on the extrapolation of the current safety analysis, that the consequences of a four-pump loss of flow would still be acceptable (i.e., above minimum departure from nucleate boiling ratio limit) even assuming a trip at 92.37 percent (94.37 - 2 percent uncertainty).

Continued evaluation of the low-flow-trip revealed a similar setpoint error occurred in the three-pump low-flow-trip, as a result of failing to perform Test Procedure T-69. Although the Technical Specification limit for the three-pump low-flow-trip setpoint was not met, three pump operation has occurred only once in recent operations. Specifically, on September 16, 1984, a primary coolant pump (PCP) was tripped concurrent with plant shutdown, in response to a PCP seal failure.

The analysis performed to evaluate the three-pump low-flow-trip setpoint resulted in additional review of Test Procedure T-69. These reviews identified that the calculational method specified by T-69 to determine the three-pump low-flow-trip setting would result in a trip value that would not meet the Technical Specification limit for three-pump operation.

T-69 specifies that the three-pump trip be set at 90 percent of the three-pump measured flow. Technical Specification Table 2.3.1 requires the three-pump low-flow-trip to occur at greater than or equal to 71 percent of the four-pump measured flow. In correlating the three-pump measured flow to the four-pump measured flow, the presence of reversed loop flow in the idle loop was not considered. Also, the steam generator dp detectors provide a positive output for both normal forward flow or reversed loop flow. Neither of these effects were considered when Test Procedure T-69 was originated in 1974. However, calculations using actual three-pump loop flow measurements, based on PCP dp and pump flow curves taken in 1975, indicate that the low-flow-trip would have been set 1.8 percent below the Technical Specification limit using Test Procedure T-69.

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TEXT (If more space is required, use additional NRC Form 388A's) (17)

Technical Specification 3.1.1(c) requires the Plant to be in hot standby within 24 hours with one or more pumps out of service. Three-pump operation is prevented from being a prolonged operating condition by this requirement. Any reliance placed on the three-pump low-flow-trip would have been limited in duration.

Test Procedure T-69 was performed on November 15, 1984, during plant startup. The correct four-pump low-flow-trip setpoints have been established. The three-pump low-flow-trip setpoints have been adjusted to cause a trip if the setpoint selector switch is placed in the three-pump position. Three-pump operation is thereby precluded until all concerns relating to T-69 calculations have been resolved.

Surveillance Procedure MI-2 will be revised to include requirements to ensure Test Procedure T-69 is performed as required and that the correct trip values are available and referenced. Additional corrective action will be to evaluate the calculations performed by T-69 and determine a three-pump low-flow-trip setpoint.

As noted, the four-pump low-flow-trip setpoint error was identified on November 9, 1984. The details of this occurrence were reported in Revision 0 to this LER on December 10, 1984. During evaluation of the four-pump low-flow-trip setpoint, additional areas were identified that would require notification. Although the additional items were initially discovered on December 13, 1984, it was not until January 10, 1985 that the details were made available and the reportability determined. On January 10, 1985, notification was made to the NRC by telephone to identify these new concerns.



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US Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

DOCKET 50-255 - LICENSE DPR-20 -
PALISADES PLANT - LICENSEE EVENT REPORT 84-023, REVISION 1 - REACTOR TRIP SET
LESS THAN TECHNICAL SPECIFICATION LIMIT

Licensee Event Report 84-023, Revision 1 (Reactor Trip Set Less than
Technical Specification Limit) is attached. This event is reportable to the
NRC per 10CFR50.73(a)(2)(i), (a)(2)(ii), (a)(2)(v) and (a)(2)(vii).

Ralph R. Frisch
Senior Licensing Analyst

CC Administrator, Region III, USNRC
NRC Resident Inspector - Palisades

Attachment

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