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February 28, 2001
JAFP-01-0044

United States Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Stop O-P1-17
Washington, D.C. 20555

Subject: **Docket No. 50-333**
LICENSEE EVENT REPORT: LER-00-011-01 (DER-00-03945)

**Shutdown Cooling Suction Valve Isolation When Securing Reactor
Recirculation Pumps**

Dear Sir:

Revision 0 of this report was submitted in accordance with 10 CFR 50.73(a)(2)(iv), "Any event or condition that resulted in a manual or automatic actuation of any engineered safety feature (ESF), including the reactor protection system (RPS)".

Revision 1 of this report is submitted to provide the results of analysis completed subsequent to the original revision.

There are no commitments contained in this report.

Questions concerning this report may be addressed to Mr. John Hoddy at (315) 349-6538.

Very truly yours,

A handwritten signature in black ink, appearing to read "T. A. Sullivan".

T. A. Sullivan

TAS:JRH:las
Enclosure

cc: USNRC, Region 1
USNRC, Project Directorate
USNRC Resident Inspector
INPO Records Center

IE22

LICENSEE EVENT REPORT (LER)

(See reverse for required number of
digits/characters for each block)

Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0104), Office of Management and Budget, Washington, DC 20503. If an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

FACILITY NAME (1)

James A. FitzPatrick Nuclear Power Plant

DOCKET NUMBER (2)

05000333

PAGE (3)

1 OF 4

TITLE (4)

Shutdown Cooling Suction Valve Isolation When Securing Reactor Recirculation Pumps

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 NAME	DOCKET NUMBER
08	28	00	00	011	01	02	28	01	N/A	05000
									FACILITY NAME	DOCKET NUMBER
									N/A	05000
OPERATING MODE (9)		N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
			20.2201(b)			20.2203(a)(2)(v)			50.73(a)(2)(i)	50.73(a)(2)(viii)
POWER LEVEL (10)		000	20.2203(a)(1)			20.2203(a)(3)(i)			50.73(a)(2)(ii)	50.73(a)(2)(x)
			20.2203(a)(2)(i)			20.2203(a)(3)(iii)			50.73(a)(2)(iii)	73.71
			20.2203(a)(2)(ii)			20.2203(a)(4)			50.73(a)(2)(iv)	<input checked="" type="checkbox"/> OTHER
			20.2203(a)(2)(iii)			50.36(c)(1)			50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A
			20.2203(a)(2)(iv)			50.36(c)(2)			50.73(a)(2)(vii)	

LICENSEE CONTACT FOR THIS LER (12)

NAME

Mr. John Hoddy, Sr. Licensing Engineer

TELEPHONE NUMBER (Include Area Code)

(315) 349-6538

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)

YES (If yes, complete EXPECTED SUBMISSION DATE).		X	NO	EXPECTED SUBMISSION	MONTH	DAY	YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

This report is provided as a supplement to previously submitted LER-00-011. This event is not reportable under the current requirements.

At 0840 hours on August 28, 2000, the plant was shut down with a cooldown in progress. Shutdown cooling suction piping had been filled and vented, and shutdown cooling suction valves (10MOV-17 and 10MOV-18) were open in preparation for entering shutdown cooling. At 0851 hours, shortly after securing recirculation (RWR) [AD] pumps, 10MOV-17 was observed to have closed. Investigation revealed tripped relays associated with a shutdown cooling isolation for the 10MOV-17 valve. Analogous relays for 10MOV-18 were not tripped and 10MOV-18 remained open.

Reactor pressure was confirmed to be approximately 2 psig. No annunciators or indications were received which would indicate a shutdown cooling isolation. The isolation was attributed to a pressure transient associated with securing RWR pumps. The isolation signal was reset, 10MOV-17 was reopened, and the plant placed in shutdown cooling without further incident.

The reason the isolation only occurred for the 10MOV-17 and not also for the 10MOV-18 valve is discussed under Analysis of the Event.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)		
James A. FitzPatrick Nuclear Power Plant	05000333	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 4		
		00	011	01			

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

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EVENT DESCRIPTION

On August 28, 2000 at 0840, with the plant shut down and a cooldown in progress, preparations were underway for placing the shutdown cooling mode of the Residual Heat Removal System (RHR/LPCI) [BO] in service. Shutdown cooling motor operated suction valves (10MOV-17 and 10MOV-18) were open following completion of filling and venting the shutdown cooling suction piping. Recirculation (RWR) [AD] pumps were running at approximately 44 percent core flow, with reactor pressure at approximately 2 pounds per square inch (gauge). At 0843, the "A" RWR pump was secured, followed at 0845 by the "B" RWR pump. At 0851, 10MOV-17 was observed to be closed. Investigation found relays associated with a shutdown cooling isolation for 10MOV-17 (relays 16A-K30 and 16A-K54) in a tripped (de-energized) condition, indicating receipt of an isolation signal for 10MOV-17. Analogous relays for 10MOV-18 remained energized.

A review of plant parameters and annunciators showed nothing that should have caused a shutdown cooling isolation. The isolation was believed caused by a transient pressure perturbation resulting from securing recirculation pumps. The isolation relays were reset and 10MOV-17 reopened. The plant proceeded into shutdown cooling without further incident.

Initial assessment did not evaluate this event as reportable, since shutdown cooling was yet not in service (10 CFR 50.73(a)(2)(iv)(B)(1) refers.) Subsequent reassessment determined that the event was reportable in that, although shutdown cooling was not in service, it could not be considered "properly removed from service", as required by 10 CFR 50.73(a)(2)(iv)(B)(1) criteria. An ENS notification was made at 1731.

CAUSE OF THE EVENT

The cause of the event was the tripping of isolation relays 16A-K30 and 16A-K54 which closed shutdown cooling isolation valve 10MOV-17. The most probable cause of the relay trip was a short duration pressure transient in the "B" RWR suction line resulting from securing recirculation pumps. The pressure transient caused pressure switches 02PS-128A and/or 02PS-128B (which both sense pressure off the "B" recirculation suction line) to actuate, tripping the aforesaid relays.

A detailed event analysis, conducted using Kepner-Tregoe® problem analysis methodology, determined that the only plausible cause of the isolation was a pressure transient associated with securing recirculation pumps. Isolation relays 16A-K30 and 16A-K54 were found tripped (de-energized) with the trip signal sealed in, as in receipt of a valid isolation signal. Other possible causes evaluated (e.g., voltage transients, operator error, concurrent maintenance activities, other possible isolation signals, equipment failure) were either inconsistent with event observations or would not have caused the observed isolation.

The cause of the pressure transient was the securing of RWR pumps. A transient occurs as the velocity head of flowing water dissipates when the pump discharge isolation valve is closed and the pump trips. This pressure transient would not be observed by plant instrumentation. Such transients are local to the piping involved and are of very short duration. Normal plant instrumentation does not sense or display RWR suction line pressure. The only instruments sensing this pressure are the pressure switches associated with shutdown cooling isolation.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)	
James A. FitzPatrick Nuclear Power Plant	05000333	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	3 OF 4	
		00	011	01		

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

ANALYSIS OF THE EVENT

Shutdown cooling suction piping is attached to the reactor vessel via the "B" RWR suction line. Shutdown cooling isolation trip signals are provided by two pressure switches (02PS-128A and 02PS-128B) independently attached to the "B" RWR suction line. The purpose of this isolation is to protect the low pressure Residual Heat Removal (RHR) [BO] piping associated with shutdown cooling from overpressurization events. Pressure transients in the "B" RWR suction line are sensed by both switches.

Pressure switch contacts are set to open on high (increasing) reactor pressure between 50 and 75 psig. Upon opening, the pressure switch contacts de-energize associated relays (16A-K28 for 02PS-128A, 16A-K50 for 02PS-128B), which each open contacts in isolation circuitry for both 10MOV-17 and 10MOV-18. Isolation signals are locked in until reset via a seal-in circuit. The arrangement is such that even a momentary opening of either pressure switch will send an isolation signal to both 10MOV-17 and 10MOV-18 isolation logic.

The fact that the isolation was observed for 10MOV-17 but not 10MOV-18 is indicative that either the isolation signal was not received by the 10MOV-18 circuitry, or that the signal was of such short duration that the action for the 10MOV-18 circuitry did not go to completion. Failure to receive the isolation signal could be caused by sticking contacts, although satisfactory relay operation has been observed during quarterly surveillance testing. Failure of relay action to go to completion could occur during an extremely short duration transient (such as a pressure spike), where the actuating pressure switch recloses and associated relays reenergize before the isolation relays for 10MOV-18 fully drop out (contacts open) and seal in. This condition can result from sluggish relay operation or from nominal differences in relay response, depending on the duration of the transient.

Plans originally called for replacing the relays associated with 10MOV-17 and 10MOV-18 during a maintenance window in Refueling Outage (RO) 14 for bench testing and failure analysis. Assessment of the risk associated with replacing these relays concluded that, due to the close proximity of these relays to other energized relays controlling sensitive plant equipment, the risk was not justified. Instead, the relay coils were replaced during the maintenance window, and bench testing was performed on a like kind typical CR120A0210Z AC 115V 60Hz relay. The testing confirmed that typical relay response characteristics are such that short duration pressure transients such as those associated with securing RWR pumps may result in the anomalous isolation noted.

The order in which the RWR pumps were secured is considered a contributing factor to the pressure transient causing the isolation. The "A" RWR pump was secured first, with its discharge isolation valve closed. When the "B" RWR pump was later secured, less of a relief path remained for dissipation of any resulting pressure transient, resulting in a higher pressure transient sensed by the shutdown cooling isolation pressure switches. The plant shutdown procedure was revised to recommend securing the "B" RWR pump before the "A" pump.

The event is not considered safety significant. Shutdown cooling was not in service at the time, and the event did not prevent the subsequent entry into shutdown cooling.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)	
James A. FitzPatrick Nuclear Power Plant	05000333	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	4 OF 4	
		00	011	01		

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

EXTENT OF CONDITION

The condition is believed to have been caused by a shutdown cooling isolation resulting from a pressure transient associated with securing reactor recirculation pumps. As such the condition is limited to shutdown cooling suction valve isolation circuitry. Event analysis and equipment evaluation confirmed a short duration pressure transient as the most probable cause of the event, identified no equipment failures associated with the event, and identified no other plausible cause for the anomalous isolation (one valve isolated, one did not).

SAFETY SYSTEM FUNCTIONAL FAILURE REVIEW

Shutdown cooling was not in service at the time of the event and the event did not impede the subsequent entry into shutdown cooling. This event does not constitute a safety system functional failure in the context of NEI 99-02, Rev. 0.

CORRECTIVE ACTIONS

1. The isolation was reset and the plant placed in shutdown cooling. **(Complete)**
2. A Kepner-Tregoe® problem analysis was conducted to determine the most probable cause of the event and to assess further corrective actions. **(Complete)**
3. A change was made to the plant shutdown procedure recommending securing the "B" RWR pump before the "A" RWR pump when preparing to enter shutdown cooling. **(Complete)**
4. Relay coils were replaced on affected relays during RO14. Bench testing was conducted on a like kind relay to provide relay response characteristics for subsequent event analysis. **(Complete)**
5. Additional problem analysis incorporating the results of relay testing and failure analysis was conducted using Kepner-Tregoe methodology. The analysis confirmed the probable root cause of the event to be a short duration pressure transient associated with securing RWR pumps. **(Complete)**

FAILED COMPONENTS

None

PREVIOUS SIMILAR EVENTS

LERs 97-002, 93-005, 92-046, 90-020, 90-016, and 90-011 describe previous shutdown cooling isolations. The conditions of these previous isolations differ from those reported in this LER, in that previous isolations were not associated with securing RWR pumps.