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JAFP-05-0133

United States Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Station P1-137
Washington, D.C. 20555

Subject: **Docket No. 50-333**
LICENSEE EVENT REPORT: LER-05-004 (CR-JAF-2005-02749)

Residual Heat Removal (RHR) Shutdown Cooling Line Through-Wall Crack

Dear Sir:

This report is submitted in accordance with 10 CFR 50.73(a)(2)(vii)(B) "Any event where a single cause or condition caused at least one independent train or channel to become inoperable in multiple systems or two independent trains or channels to become inoperable in a single system designed to remove residual heat."

There are no commitments contained in this report.

Questions concerning this report may be addressed to Mr. Rick Plasse at (315) 349-6793.

Very truly yours,

T. A. Sullivan

TAS:DD:dd
Enclosure

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

IE22

NRC FORM 366 (7-2001)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 7-31-2004

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LICENSEE EVENT REPORT (LER)

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

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
James A. FitzPatrick Nuclear Power Plant	05000333	1 OF 4

4. TITLE
Residual Heat Removal (RHR) Shutdown Cooling Line Through-Wall Crack

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME N/A	DOCKET NUMBER 05000
07	04	05	05	04	00	08	29	05	FACILITY NAME N/A	DOCKET NUMBER 05000

9. OPERATING MODE	4
10. POWER LEVEL	000

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)

	20.2201(b)		20.2203(a)(3)(ii)		50.73(a)(2)(ii)(B)		50.73(a)(2)(ix)(A)
	20.2201(d)		20.2203(a)(4)		50.73(a)(2)(iii)		50.73(a)(2)(x)
	20.2203(a)(1)		50.36(c)(1)(i)(A)		50.73(a)(2)(iv)(A)		73.71(a)(4)
	20.2203(a)(2)(i)		50.36(c)(1)(ii)(A)		50.73(a)(2)(v)(A)		73.71(a)(5)
	20.2203(a)(2)(ii)		50.36(c)(2)		50.73(a)(2)(v)(B)		OTHER Specify in Abstract below or in NRC Form 366A
	20.2203(a)(2)(iii)		50.46(a)(3)(ii)		50.73(a)(2)(v)(C)		
	20.2203(a)(2)(iv)		50.73(a)(2)(i)(A)		50.73(a)(2)(v)(D)		
	20.2203(a)(2)(v)		50.73(a)(2)(i)(B)	X	50.73(a)(2)(vii)		
	20.2203(a)(2)(vi)		50.73(a)(2)(i)(C)		50.73(a)(2)(viii)(A)		
	20.2203(a)(3)(i)		50.73(a)(2)(ii)(A)		50.73(a)(2)(viii)(B)		

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
Mr. Darren Deretz, Sr. Regulatory Compliance Specialist	(315) 349-6851

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
B	BO	SPT	S420	N					

14. SUPPLEMENTAL REPORT EXPECTED			15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

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

On July 4, 2005, while the plant was shutdown in Mode 4, a small leak (70 drops per minute) due to a through-wall crack was discovered on the Residual Heat Removal (RHR) Shutdown Cooling (SDC) system common suction piping. At the time of discovery, the "B" RHR SDC subsystem was in service. As a result, both trains of the RHR SDC system were declared inoperable and Technical Specifications (TS) Limiting Condition for Operation (LCO) 3.4.8 Condition "A" was entered. The RHR SDC system remained in-service and continued to perform its decay heat removal function. The leakage was immediately reduced to 2 drops per minute when an adjacent support was repaired to provide adequate pipe engagement. A visual inspection revealed that the leak was located at the weld connecting the pipe support (PFSK-2285) to the RHR SDC common suction pipe.

The cause of the crack in the RHR SDC piping was determined to be low-stress, high-cycle fatigue at the heat affected zone of the weld which was caused by inadequate pipe engagement of an adjacent pipe support (PFSK-2084), during original installation.

As part of the corrective actions, an ASME Code repair was performed to repair the pipe crack and the adjacent pipe support was restored to its design condition. In addition, extensive walkdowns of pipe supports on large bore piping were performed as part of the Extent of Condition review. No degraded or nonconforming conditions were identified during this review.

There were no actual safety consequences associated with this event.

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 4
James A. FitzPatrick Nuclear Power Plant	05000333	05	004	00	

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

EIIS Codes in [ ]

Event Description:

On July 4, 2005, while the plant was shutdown in Mode 4, a through-wall crack was discovered on the Residual Heat Removal (RHR) [BO] Shutdown Cooling (SDC) system common suction piping. At the time of discovery, the "B" RHR SDC subsystem was in service. As a result, both trains of the RHR SDC system were declared inoperable and Technical Specifications (TS) Limiting Condition for Operation (LCO) 3.4.8 Condition "A" was entered. The RHR SDC system remained in-service and continued to perform its decay heat removal function. A visual inspection revealed that the crack was located at the welded connection from the pipe support (PFSK-2285) to the 20 inch diameter RHR SDC common suction pipe.

Further inspection revealed that an adjacent support (PFSK-2084), on the RHR SDC common suction pipe, was not in contact with the pipe and therefore, not bearing any load. A shim plate was immediately installed to engage this support with the subject pipe which reduced leakage at the crack from 70 drops per minute (DPM) to 2 DPM. In addition, a temporary pipe support was installed to provide supplementary support to the affected pipe until the appropriate repair was completed.

A Non Destructive Examination (NDE) inspection of the associated crack revealed a 6.5 inch crack in the pipe at the toe of the pipe support to pipe weld.

A walk down of this piping and associated supports confirmed there was no observable deformation of hangers or piping, which indicates that an overloading condition did not occur. In addition, no other instances of unloaded supports were found during an Extent of Condition review.

An ASME Code repair was performed to repair the cracked area of the RHR SDC pipe. In addition, the adjacent support (PFSK-2084) was repaired with the addition of a shim plate to ensure proper engagement with the RHR SDC pipe and the temporary support was removed.

As both subsystems of RHR SDC have a common suction line that was determined to be inoperable, this report is submitted in accordance with 10 CFR 50.73(a)(2)(vii)(B) "Any event where a single cause or condition caused at least one independent train or channel to become inoperable in multiple systems or two independent trains or channels to become inoperable in a single system designed to remove residual heat."

Cause of Event:

The cause of the crack in the RHR SDC piping was determined to be low-stress, high-cycle fatigue at the heat affected zone of the weld which was caused by increased pipe movement during operation due to inadequate pipe engagement of an adjacent pipe support (PFSK-2084) during original installation. This increased pipe movement caused the vibration and stress in the piping to increase. [Cause Code B]

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	3 OF 4
James A. FitzPatrick Nuclear Power Plant	05000333	05	004	00	

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

Event Analysis:

There are two redundant, manually controlled shutdown cooling subsystems (loops) of the RHR system. Each loop consists of two motor driven pumps, a heat exchanger, and associated piping and valves. Both loops have a common suction line from the same Reactor Water Recirculation [AD] loop.

As stated in the TS Bases, the RHR SDC mode of operation is not required for mitigation of any event or accident evaluated in the safety analyses. In addition, the RHR SDC mode of operation is not included in any relevant Safety Objective or Safety Design Basis sections of the Final Safety Analysis Report (FSAR). However, the system is designed to remove decay heat from the reactor coolant system.

Although the RHR SDC suction piping was declared inoperable by TS, all RHR subsystems remained fully capable of performing their decay heat removal functions. The RHR SDC system remained in-service and continued to perform its heat removal function. In addition, an alternate method of decay heat removal was verified as being available for each RHR SDC subsystem in accordance with the TS. Additional heat removal methods discussed in the TS Bases, such as use of the Condensate system [SD], Main Steam system [SB], Control Rod Drive system [AA] and Reactor Water Cleanup system [CE] were also verified as being available.

As stated in the FSAR, in cases where the RHR shutdown cooling suction line becomes inoperative, the low pressure cooling systems, relief valves (manually operated), and RHR system suppression pool cooling mode can be used to maintain water level and remove decay heat.

The small amount of initial leakage (70 DPM) through the crack was reduced significantly to only 2 DPM by the installation of a shim plate on an adjacent support. The piping was regularly monitored via operator rounds to allow for early detection of any adverse change in crack size, until an ASME Code repair could be performed.

In the unlikely event that the RHR SDC suction line ruptured prior to discovery of the crack, the line could have been isolated by closing the shutdown cooling inboard or outboard isolation valve. In addition, both RHR Low Pressure Coolant Injection (LPCI) [BO] subsystems and both Core Spray (CS) [BM] subsystems were operable while the RHR SDC system was in operation.

The safety significance of this event is therefore low because the RHR system safety function would have been achieved in accordance with the assumptions in the safety analysis.

Extent of Condition:

As part of the Extent of Condition review for the RHR SDC line crack, inspections were performed on accessible supports outside of the Drywell on the large bore RHR, CS, High Pressure Coolant Injection (HPCI) [BJ] and Reactor Core Isolation Cooling (RCIC) [BN] piping. No degraded or non-conforming conditions were identified during these inspections.

The plant's Pipe Support Inspection Program was evaluated to determine if any organizational or programmatic weaknesses contributed to this event. Approximately 142 JAF Condition Reports (corrective action documents) related to pipe supports, initiated over the past 12 years, were evaluated. There was only one other example of a degraded condition that was not identified by the Pipe Support Inspection Program. Considering the large number of pipe supports inspected via this program (approximately 2800 supports), the error rate is low. The evaluation concluded that no organizational or programmatic weaknesses exist and the Pipe Support Inspection Program is adequately identifying deficiencies using the plant's Corrective Action Program.

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	4 OF 4
James A. FitzPatrick Nuclear Power Plant	05000333	05	004	00	

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

Corrective Actions:

Corrective Actions Completed Prior to this Report:

1. An ASME Code repair was performed to repair the cracked area of the RHR SDC pipe.
2. A shim plate was installed on PFSK-2084 to ensure proper engagement with the RHR SDC pipe.
3. Extensive walkdowns (118) of pipe supports on large bore piping were performed as part of the Extent of Condition review. No degraded or nonconforming conditions were identified during this review.

Safety System Functional Failure Review:

This event did not result in a safety system functional failure as defined by NEI 99-02, Revision 3 as the RHR SDC mode of operation remained in-service and continued to perform its normal shutdown cooling function.

Similar Events:

No other similar issues related to the RHR pipe crack were identified in previous plant LERs.

Failed Component Identification:

Manufacturer:	Stone & Webster Engineering Corp
Model Number:	NA
NPRDS Manufacturer Code:	S420
NPRDS Component Code:	Support
FitzPatrick Component ID:	Pipe Support PFSK-2285 (on 10-20"-W20-152-2C)

References:

1. JAF Condition Report CR-JAF-2005-02749, Root Cause Analysis Report, Through Wall Leak on a Shutdown Cooling Line.
2. JAF FSAR Chapter 14