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Resident Manager

May 7, 1992
JAFFP-92-0374

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

SUBJECT: DOCKET NO. 50-333
LICENSEE EVENT REPORT: 92-018-00 - Potential Failure
of Containment Isolation
Valves to Close Due to Design
Error

Dear Sir:

This report is submitted in accordance with 10 CFR 50.73(a)(2)(v).

Questions concerning this report may be addressed to
Mr. W. Verne Childs at (315) 349-6071.

Very truly yours,

HARRY P. SALMON, JR.

HPS:WVC:lar

Enclosure

cc: USNRC, Region I
USNRC Resident Inspector
INPO Records Center

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LICENSEE EVENT REPORT (LER)

ESTIMATE BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 500 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-630), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAAP WORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503

FACILITY NAME (1) James A. FitzPatrick Nuclear Power Plant DOCKET NUMBER (2) 050003333 PAGE (3) 1 OF 05

TITLE (4) Potential Failure of Containment Isolation Valves in Residual Heat Removal Pump Min-Flow Lines to Fully Close Due to Original Plant Construction Design Error

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)
04	07	92	92	018	00	05	07	92			05000
THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5. (Check one or more of the following) (11):											

OPERATING MODE (8) N	20.402(b)	20.405(c)	50.73(a)(2)(v)	72.71(b)
POWER LEVEL (10) 000	20.405(i)(1)(i)	50.36(a)(1)	X 50.73(a)(1)	72.71(c)
	20.405(a)(1)(iv)	50.36(a)(2)	50.73(a)(2)(iv)	OTHER (Specify in Abstract below and in Text, NRC Form 356A)
	20.405(a)(1)(vii)	50.73(a)(2)(i)	50.73(a)(2)(vii)(A)	
	20.405(a)(1)(ix)	50.73(a)(2)(ii)	50.73(a)(2)(vii)(B)	
	20.405(a)(1)(x)	50.73(a)(2)(iii)	50.73(a)(2)(ix)	

LICENSEE CONTACT FOR THIS LER (12)

NAME: W. Verne Childs, Senior Licensing Engineer TELEPHONE NUMBER: 315349-6071

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE): NO: X

EXPECTED SUBMISSION DATE (15)

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

EIIS Codes are in []

The plant was shutdown and in the cold condition for maintenance and refuel. Residual Heat Removal/Low Pressure Coolant Injection (RHR/LPCI) [BO] pump minimum flow valves, which are also primary containment [NH] isolation valves, have the potential to not fully close due to premature seating of the discs during the valve closure stroke.

The double disc gate valve design includes a wedge assembly intended to convert valve stem thrust in the closed direction into seating forces on the discs at the end of the close stroke. When the valves are installed in any orientation other than with the stem vertical and pointing upward, springs are necessary to prevent potential disc seating prior to completion of the valve closure stroke. Valve internal parts will be replaced with new parts that include springs to prevent premature wedging. There have not been any similar LERs at this facility.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 500 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (F-830), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20545, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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

EIIS Codes are in []

Description

The plant was shutdown and in the cold condition for maintenance and refuel.

The Residual Heat Removal/Low Pressure Coolant Injection (RHR/LPCI) [BO] system pump minimum flow valves (10MOV-16A&B) are double disc gate valves manufactured by Anchor/Darling Valve Company. The valves were installed during original plant construction prior to 1974 and are located in a vertical pipe run.

In a letter dated March 16, 1992, Anchor/Darling (A/D) informed the plant staff that A/D double disc gate valves installed in a vertical pipe run might result in inconsistent operating thrusts and erratic results during motor operated valve diagnostic tests such as those performed to satisfy NRC Generic Letter 89-10.

A/D double disc gate valves manufactured prior to 1975 were not provided with "wedge springs" and "disc retainers" when the valve was to be installed with the valve stem vertical and pointing upward. When the valve (without wedge springs) is installed with the valve stem vertical (and pointing upward), gravity acts on the lower half of the wedge assembly and prevents contact between the upper and lower halves of the wedge assembly until the valve stem is near the fully closed position. As the valve nears the fully closed position, the lower portion of the wedge assembly contacts a boss below the wedge. As the stem continues in the closed direction, the two halves of the wedge assembly come into sliding contact with each other and apply force to both discs to tightly seat the discs.

When valves contain wedge springs, they may be installed in any orientation. The wedge spring holds the lower half of the wedge assembly out of contact with the upper half of the assembly until the spring force is overcome by valve stem thrust when the valve is near the fully closed position. As a result, premature wedging is avoided. When a valve without wedge springs is installed in any orientation other than with the valve stem pointing upward, gravitational force cannot maintain separation of the wedge halves. As a result, contact between the wedge halves forces both valve discs into contact with the valve seats. This wedging action is, by design, intended to take place only when the valve stem and discs reach the fully closed position and thus provide a positive seating force on the discs at that time.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 56.7 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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TEXT (If more space is required, use additional NRC Form 305A's) (17)

Disc retainers are parts intended to limit the freedom of motion of the discs to limit disc wobble or chatter during the valve close stroke while flow is passing through the valve. While not considered necessary for valve operability, the retainers are recommended by the manufacturer to improve overall valve performance by limiting potential disc and/or seat damage as a result of valve closure under flow induced differential pressure.

The manufacturer considers the wedge springs and disc retainers as design improvements which result in more consistent valve diagnostic test results. NYPA considers the wedge springs a necessary feature to assure valve closure if the valve is installed with any orientation other than with the valve stem in the vertical, pointing upward position.

On April 14, 1992, the Plant Operating Review Committee (PORC) determined that the lack of wedge springs in valves 10MOV-16A&B was a potential condition requiring a report under 10 CFR 50.72 and 10 CFR 50.73. The NRC was informed using the Emergency Notification System (ENS) on April 14, 1992 at 1212 hours.

Since one of the functions of the valves is to provide primary containment isolation of the RHR/LPCI pump minimum flow lines, complete closure capability of the valves is required to meet Technical Specification 3.7.D.1. Complete closure of the valves when RHR/LPCI flow exceeds approximately 450 gallons per minute (gpm) is also desirable to prevent diversion of part of the pump flow through the minimum flow line. Technical Specifications 3.5.A.3 and 3.5.F.1 require an RHR/LPCI flow of 8,910 gpm. The RHR/LPCI pumps are tested under the In-Service Test (IST) program at 10,000 gpm. As a result, the potential diversion of less than 400 gpm due to a partially closed minimum flow valve does not impact Technical Specification requirements.

Valve internal parts will be replaced with new parts that include wedge springs. Valve disc retainers will not be provided because the design of the currently installed valves does not provide sufficient space to retrofit the valve with disc retainers. Replacement of the entire valve is not practicable at this time because a Primary Containment [NH] Integrated Leakage Rate Test (PCILRT) would be required. Complete replacement during some future refuel outage, which also includes plans for conducting a PCILRT, will be considered.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION, REQUEST 500 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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

Cause

The cause of the event was an original plant construction design error. Valves 10MOV-16A&B were not installed with the valve stem in the vertical, pointing upward orientation. The valve manufacturer did not supply double disc gate valves with wedge springs and/or disc retainers for valves with vertical stems at the time of original plant construction.

Analysis

The RHR/LPCI pump minimum flow valves are dual function valves. The valves function protect the RHR/LPCI pump from overheating when system flow is less than approximately 450 gallons per minute (gpm) by opening to allow a small fraction of the pump flow to return to the primary containment pressure suppression pool (torus). The opening of the valves to provide minimum flow protection for the pump is not effected by the lack of wedge springs or disc retainers.

The valves also perform a primary containment isolation function. The valve control circuit design allows remote manual valve closure from the main control room [NA] in the event conditions require closure. It is this remote manual primary containment isolation valve function which is effected by the lack of wedge springs due to the potential premature seating of the discs (prior to full valve closure) due to contact between the upper and lower halves of the wedge assembly.

Potential failure of the valves to fully close (when required for primary containment) is considered a condition that alone could prevent the fulfillment of the safety function of systems needed to control the release of radioactive material and to mitigate the consequences of accidents described in the Final Safety Analysis Report (FSAR).

As a result, the condition requires a report under 10 CFR 50.73 (a)(2)(v)(C) and (D).

Corrective Action

1. No immediate action was necessary because primary containment integrity was not required by Technical Specifications.
2. Internal parts of valves 10MOV-16A&B will be replaced prior to start-up following the 1992 Refuel Outage with new parts that include wedge springs. This action is expected to allow complete valve closure without premature contact of the upper and lower halves of the wedge assembly and thus avoid premature disc seating.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST 500 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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

3. The installation of other Anchor/Darling double disc gate valves in locations where the valve is required to perform a safety-related function will be reviewed to verify there are not any additional potential deficiencies. This action will be completed prior to start-up from the 1992 Refuel Outage.
4. Other facilities were notified by entering a description of the potential deficiency into the Institute of Nuclear Power Operations (INPO) NUCLEAR NETWORK system. Completed May 1, 1992.
5. Complete replacement of the valves with both wedge springs and disc retainers (or replacement with valves of a different design) will be evaluated. The evaluation will be completed by December 31, 1992.

Additional Information

Failed Components: None

Previous Similar Events: No other LERs with regard to the actual or potential failure of double disc gate valves to properly close as a result of improper orientation or the lack of wedge springs have been submitted by this facility.