

NON-PUBLIC?: N
ACCESSION #: 9204290267
LICENSEE EVENT REPORT (LER)

FACILITY NAME: JAMES A. FITZPATRICK NUCLEAR POWER PLANT PAGE: 1
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DOCKET NUMBER: 05000333

TITLE: HIGH COOLANT INJECTION INSTRUMENT LINE FAILURE
EVENT DATE: 09/17/91 LER #: 91-019-01 REPORT DATE: 04/15/92

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: N POWER LEVEL:

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION:
50.73(a)(2)(v)

LICENSEE CONTACT FOR THIS LER:
NAME: DOUGLAS MURPHY TELEPHONE: (315) 349-6519

COMPONENT FAILURE DESCRIPTION:
CAUSE: B SYSTEM: BJ COMPONENT: PSF MANUFACTURER: B345
REPORTABLE NPRDS: Y

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

UPDATE REPORT - PREVIOUS REPORT DATE 10/17/91

ABSTRACT

EIIS Codes are in !

During normal operation at 100 percent rated power, the quarterly flow rate surveillance of the High Pressure Coolant Injection System (HPCI) BJ! was performed on 09/17/91 in accordance with Technical Specification 4.5.C.1. The Local Leak Rate Test (LLRT) line on the HPCI turbine exhaust line check valve (23HPI-65) failed at a socket weld. Manual valve 23HPI-11 was shut in order to isolate the exhaust line from the primary containment NH! torus. HPCI was declared inoperable initiating a 7-day Limiting Condition for Operation (LCO). Root cause evaluation of this failure indicated poor weld quality as a result of paint

contamination during installation. Corrective actions included modification of the piping to reduce the bending moment of the LLRT connection. HPCI was declared operable on 9/19/91. HPCI was inoperable for 64.3 hours.

END OF ABSTRACT

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UPDATE REPORT - PREVIOUS REPORT DATE 10/17/91

EIIS Codes are in !

DESCRIPTION

During normal plant operation at 100 percent rated power, the quarterly Surveillance Test, ST-4N, "HPCI Flow Rate and Inservice Injection (IST)", was performed on September 17, 1991 at approximately 5:07 A.M. to verify proper High Pressure Coolant Injection (HPCI) BJI system operation in accordance with Technical Specification 4.5.C.1. During performance of the test, the Local Leak Rate Test (LLRT) line on the HPCI turbine exhaust check valve (23HPI-65) failed at a socket weld. The line was isolated from the primary containment NH1 torus by shutting manual isolation valve 23HPI-11. The HPCI system was declared inoperable due to isolation of the turbine exhaust line.

The original LLRT piping configuration consisted of two isolation valves and a pressure gauge. The pressure gauge and one of the isolation valves are no longer used and were removed. The socket weld was repaired and the modified piping configuration was installed. This action was taken as a conservative measure to reduce the cantilevered weight on the LLRT piping.

ST-4N was performed successfully on September 19, 1991 demonstrating operability. The HPCI system was inoperable for 64.3 hours.

CAUSE

A comprehensive root cause analysis of the fractured pipe was performed. The failure mode was determined to be fatigue fracture, assisted by liquid metal embrittlement of the weld material. Zinc contamination was found in the weld area. The zinc contamination resulted in liquid metal embrittlement of the weld material. Small undersurface cracks might have been initiated at the time of welding. The subsequent small amplitude vibration induced by turbulence during HPCI system operation propagated the cracks to the point of initiating a through-wall leak. The root

cause of the failure was the presence of paint on the surface of the pipe during welding.

A calculation using the original piping configuration was performed which verified the piping stress at the failed joint was below the material endurance limit for that piping class. The modified piping configuration was also evaluated for its susceptibility to the same failure mode. The evaluation shows that the new design will not experience fatigue failure.

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In conjunction with the root cause evaluation of the 23HPI-65 LLRT line failure, a review of previous small bore failures at JAF was performed. Results of the evaluation indicate that the failures fall into two basic categories:

1. Failures at welded connections due to poor weld quality.
2. Failures caused by vibration induced fatigue of piping.

Based on this review, a review and analysis of small bore piping attachments will be performed to establish installation guidance and inspection criteria. The installation guidance will be used to evaluate proposed small bore piping attachments. The inspection criteria will be used to evaluate existing piping to determine if the piping is likely to experience fatigue failure.

ANALYSIS

Because the HPCI system was inoperable due to failure of an LLRT line on the turbine exhaust line, it qualifies as an event reportable under 10 CFR 50.73 (a) (2) (v) as an event or condition that alone could have prevented the fulfillment of the safety function of a system needed to remove residual heat or mitigate the consequences of an accident.

Surveillance tests verified that the backup emergency core cooling system were operable. When HPCI was not available, core coverage was assured by the Automatic Depressurization System AD!, together with the Low Pressure Emergency Core Injection Systems (Low Pressure Core Spray BM! and Residual Heat Removal/Low Pressure Coolant Injection RO!).

CORRECTIVE ACTION

1. The socket weld was repaired and a modified piping configuration was installed. This action was taken as a conservative measure to reduce the cantilevered weight on the LLRT piping. Completed on

September 19, 1991 under plant modification M1-91-251.

2. A comprehensive root cause analysis was performed on the fractured pipe. Completed on 12/16/91. Documented in JSEM-91-072.

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3. A review and analysis of small bore piping attachments will be performed to establish installation guidance and inspection criteria. The installation guidance will be used to evaluate proposed small bore piping attachments. The inspection criteria will be used on existing piping to determine what lines are likely to experience fatigue failure. Due date 11/1/92, ACTS item number 3437. In addition, a pilot plan for evaluating piping branch lines will be performed during the 1992 Refuel Outage. Approximately 30-40 branch lines in systems that have experienced either a failure or high vibration will be inspected and evaluated for failure potential. Documented in WPO-SED-92-0141.

4. Operator training will incorporate guidance to identify piping which appears to experience excessive vibration. Operator round sheets will provide space to document these conditions. This information will be forwarded to site engineering for resolution. Due date 12/1/92, ACTS item number 3439.

5. General Welding Procedure GWP-1, "ASME/ANSI Code Welding" provides specific instruction that weld surfaces be free of paint and other deleterious material. Evaluation of the failed joint indicates weld contamination from paint had occurred. The lesson learned from this failure will be incorporated into welder training. Due date 6/30/92, ACTS item number 3440.

ADDITIONAL INFORMATION

The updated-report incorporates the results of the weld failure analysis and additional corrective action to reduce the probability of recurrence.

ATTACHMENT 1 TO 9204290267 PAGE 1 OF 1

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Authority Resident Manager

April 22, 1992
JAFP-92-0336

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

SUBJECT: DOCKET NO. 50-333
LICENSEE EVENT REPORT: 91-019-01 - HPCI Declared Inoperable
Due to Instrument Line
Failure

Dear Sir:

Enclosed is supplement 1 to the Licensee Event Report which was submitted
in accordance with 10 CFR 50.73 (a) (2) (v) on October 17, 1991.

This supplement provides the results of a detailed metallurgical analysis
on a small bore pipe failure.

If there are any questions concerning this report, please contact Mr.
Douglas Murphy at (315) 349-6519.

Very truly yours,

HARRY P. SALMON,
RESIDENT MANAGER

HPS:DM:llm

Enclosure

cc: USNRC, Region I
USNRC Resident Inspector
INPO Records Center
JAFP File
RMS - JAF

*** END OF DOCUMENT ***
