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November 20, 2008
JAFP-08-0123

United States Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Subject: **Docket No. 50-333**
License No. DPR-59

LICENSEE EVENT REPORT: LER-2008-002-00
Reactor Pressure Vessel Recirculation Inlet Nozzle Axial Flaw Indication, Discovered During Refueling Outage, Consistent With Inter-Granular Stress Corrosion Cracking

Dear Sir or Madam:

This report is submitted in accordance with 10 CFR 50.73(a)(2)(ii)(A), "Any event or condition that resulted in the condition of the nuclear power plant, including its principal safety barriers, being seriously degraded".

There are no commitments contained in this report.

Questions concerning this report may be addressed to Mr. Gene Dorman, Acting Licensing Manager, at (315) 349-6810.

Very truly yours,

Pete Dietrich
Site Vice President

PD:jm
Enclosure

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

IE22
NRR

NRC FORM 366 (9-2007) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 08/31/2010

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose 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.

LICENSEE EVENT REPORT (LER)

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4. TITLE Reactor Pressure Vessel Recirculation Inlet Nozzle Axial Flaw Indication discovered during Refueling Outage Consistent with Inter-Granular Stress Corrosion Cracking

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									N/A	05000
09	23	2008	2008	- 002 -	00	11	24	2008	FACILITY NAME: N/A	DOCKET NUMBER: 05000

9. OPERATING MODE: 5

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

12. LICENSEE CONTACT FOR THIS LER

CONTACT NAME	TELEPHONE NUMBER *(Include Area Code)*
Mr. Gene Dorman, Acting Licensing Manager	(315) 349-6810

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
X	AD	NZL	0082	Y					

14. SUPPLEMENTAL REPORT EXPECTED

○ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ◉ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

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

On 09/23/2008 at 1654, with the plant shutdown and in refueling mode (Mode 5) (Refueling Outage 18), an ultrasonic (UT) examination was performed, in accordance with the In-Service Inspection (ISI) Program, on Reactor Pressure Vessel (RPV) Reactor Recirculation Inlet nozzle, N2-C, that showed an inner diameter axial flaw indication approximately 0.8" long with a 0.5" wall depth. The flaw indication, in the dissimilar metal weld (DMW) area of RPV N2-C nozzle to safe-end weld, is consistent with inter-granular stress corrosion cracking (IGSCC).

JAF performed a full structural weld overlay repair based on ASME Codes cases N-740 and N-638-1. This code alternative repair procedure was submitted to and approved by the NRC by as ISI Program Relief Request RR-7.

The other N2 nozzles had been inspected during Refueling Outage 17 or were inspected during Refueling Outage 18 using enhanced PDI techniques with satisfactory results. No adverse safety consequences were associated with this event. This condition was reported to the NRC Operations Center via the Emergency Notification System (EN# 44516) pursuant to 10CFR50.72(b)(3)(ii)(A) as a seriously degraded principle barrier (8-hour report).

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

BACKGROUND

The Reactor Pressure Vessel [EIIS=RPV] and appurtenances are designed to withstand adverse combinations of loading and forces resulting from operations under normal, abnormal and accident conditions. The RPV has ten (10) 14- 3/8 inch tapered to 12" inch diameter, symmetrically oriented nozzles [EIIS=NZL] N2-A thru N2-K, that provide an inlet flow path from the Reactor Recirculation [EIIS=AD] pumps to Reactor Recirculation Jet Pumps. The N2 nozzles are SA-508 carbon steel, Class 2, with SST cladding (P-No. 3, Group 3 low alloy steel), the nozzle safe-ends are fabricated from SA-182, F-304 stainless steel (P-No. 8 stainless steel). The dissimilar metal weld (DMW) joins the P-No. 3, Group 3 low alloy steel nozzle to the P-No. 8 austenitic stainless steel safe-end using 82/182 Inconel as the weld material.

Inter-granular stress corrosion cracking (IGSCC in boiling water reactors (BWR) piping is an industry wide concern. Engineering studies and industry studies have shown that Inconel 82/182 is susceptible to IGSCC. JAF manages the potential for IGSCC using hydrogen water chemistry (HWC) and noble metal chemical addition (NMCA). The effectiveness of the chemistry program in inhibitting IGSCC is verified through In-Service Inspections in accordance with ASME Section XI and the inspection requirements of Boiling Water Reactor Vessel Internals Project (BWRVIP) report BWRVIP-75A. BWRVIP-75A provides the basis for inspection criteria for Category A through E welds for NWC and HWC/NMCA. The report defines Category "D" welds as those made of susceptible materials that have not been treated with an IGSCC remedy and were found to be free of cracks when examined using Performance Demonstrative Initiative (PDI) qualified methods. The report requires Category "D" weld examinations using PDI methods at least once every ten (10) years for HWC/NMCA protected systems.

JAF scheduled all Category "D" RPV Nozzle DMW(s) using PDI qualified methods for examination in Refueling Outages 17 and 18 RO-17 and RO-18). Twelve (12) Category "D" RPV Nozzle DMW(s) were scheduled for inspection during RO-18, including eight (8) RPV N2 nozzle DMW(s) that had not been inspected during RO-17. During RO-17 and RO-18 a population of fifteen (15) Category "D" RPV Nozzle DMW(s) were inspected using PDI qualification methods and only the N2-C showed an indication of a flaw. This population includes all of the reactor vessel Category "D" DSM welds.

The N2-C DMW was previously inspected with satisfactory results in 1988, 1992, 1996 and 2000 using non-PDI examination methods.

EVENT DESCRIPTION

On September 23, 2008 at 1654, while the James A. FitzPatrick Nuclear Power Plant (JAF) was shutdown (Mode 5) and in a refueling outage (R18), an ultrasonic testing (UT) examination was performed on the RPV Reactor Recirculation Inlet to Jet Pump Nozzle N2-C nozzle to safe-end DMW. The examination showed an inner diameter axial flaw indication approximately 0.8" long with a 0.5" wall depth. The flaw indication, in the DMW area is consistent with IGSCC. The DMW joins a P-No. 3, Group 3 low alloy steel nozzle to a P-No. 8 austenitic stainless steel safe-end using 82/182 Inconel as the weld material. Analysis of the data determined that the flaw was axially oriented, inner diameter connected, extended into the "butter" region, and was indicative of IGSCC. The N2-C DMW was one of eight (8) RPV N2 nozzle-to-safe-end DMW(s) that had been scheduled for UT examination during RO-18.

JAF installed a full structural weld overlay to the N2-C DMW using an alternative repair procedure approved by the NRC. This repair involved the installation of a full structural weld overlay by deposition of Alloy 52M (ERNiCrFe 7A) weld metal on the outside surface of the DMW and adjacent base material. The repair methodology reduces the potential for IGSCC based on the use of filler metals that are resistant to this mechanism (e.g., Alloy 52M).

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The remaining seven (7) N2 nozzles scheduled for inspection in RO-18 were examined and determined to be free of cracks. Two (2) other N2 nozzles were previously inspected with satisfactory results during RO-17 in 2006.

This event was reported to the NRC Operations Center via the Emergency Notification System as EN# 44516 pursuant to 10CFR50.72(b)(3)(ii)(A) as a seriously degraded principle barrier (8-hour report). The event also requires submittal of a written report within sixty (60) days of discovery, in accordance with 10CFR 50.73(a)(2)(ii)(A), "Any event or condition that resulted in the condition of the nuclear power plant, including its principal safety barriers, being seriously degraded".

EVENT ANALYSIS

The RPV N2 nozzles provide an inlet flow path from the reactor recirculation pumps to the the reactor recirculation jet pumps. IGSCC is an industry wide concern and DMWs are known to be susceptible to IGSCC. JAF manages the potential for IGSCC through the use of hydrogen water chemistry and noble metal chemical addition. The effectiveness of these methods is verified through periodic inspections in accordance with ASME Section XI and the inspection requirements of BWRVIP-75A. The N2-C DMW was one of eight (8) RPV N2 nozzle to safe-end DMW(s) scheduled for UT examination during RO-18 as part of JAF's commitment to complete all RPV Category "D" DMW(s) examinations using PDI qualified methods in RO-17 and RO-18. As result of meeting this commitment a population of 15 RPV Category "D" DMW welds were inspected. No other flaws were identified during these examinations.

The ASME Section XI Code version adopted by the JAF In-service Inspection Program does not provide an approved method for predicting crack growth in axially oriented flaws. As a result, the flaw could not be evaluated for impact on plant safety and was considered to be a serious degradation of a principle radiological barrier subject to the reporting requirements of 10CFR50.72(b)(3)(ii)(A) and 10CFR50.73(a)(2)(ii)(A).

There were no safety related system responses, personnel errors or procedural deficiencies associated with this condition at the time of discovery or during the period prior to identification.

CAUSE OF EVENT

The flaw indication, in the dissimilar metal weld (DMW) area of RPV N2-C nozzle to safe-end weld, is consistent with inter-granular stress corrosion cracking (IGSCC). Due to the location of the flaw a sample could not be extracted to definitively determine the cause.

EXTENT OF CONDITION

The RPV N2 nozzle to safe-end welds are dissimilar metal welds (DMW) listed as Category "D" in BWRVIP-75A. These DMW(s) consist of a carbon-steel nozzle welded to a stainless-steel safe-end using Inconel 82/182 as the weld metal. Engineering studies and industry observations have determined that Inconel 82/182 is susceptible to IGSCC.

The N2-C DMW was one of eight (8) RPV N2 nozzle to safe-end DMW(s) scheduled for UT examination during RO-18 as part of JAF's commitment to complete all RPV Category "D" DMW(s) examinations using PDI qualified methods in RO-17 and RO-18. All 15 RPV Category "D" DMW welds were inspected in RO-17 and RO-18 and no other flaws were identified during these examinations.

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FAILED COMPONENT IDENTIFICATION

Manufacturer:	General Electric Co. – Nuclear Engineering Division
Model No:	N/A
NPRDS Manufacturer Code:	0082
NPRDS Component Code:	Nozzle
FitzPatrick Component ID:	N2C-SE

CORRECTIVE ACTIONS
Immediate Corrective Actions:

1. Completed RO-18 DMW inspection scope for remaining RPV nozzle to safe-end examinations.
2. Issued Engineering Change (EC) document supporting weld overlay.
3. Submitted Relief Request RR-7, requesting approval of an alternative repair plan based on ASME Code Cases N-740 and N-638-1.

Completed Corrective Actions:

1. Installed a full structural weld overlay in accordance with the NRC approved relief request.
2. Completed RO-18 walk downs for RO-19 scheduled inspections of RHR Category "D" DMWs.
3. Determined the inspection interval and next inspection for the installed weld overlay using Code Case N-740.

Planned Corrective Actions:

1. Complete the four (4) RHR Category "D" weld inspections in RO-19.

ASSESSMENT OF SAFETY CONSEQUENCES

The RPV N2-C DMW axial flaw was discovered during an in-service inspection conducted while the plant was shutdown and in refueling mode (Mode 5). The N2-C DMW was previously inspected with satisfactory results in 1988, 1992, 1996 and 2000. The N2-C DMW was one of eight (8) RPV N2 Nozzle DMW(s) scheduled for UT examination during RO-18 using PDI qualified examination methods.

The safety significance of this event is considered minimal. The flaw axial extension was approximately 0.8 inches with an approximate depth of 0.5" (approximately 40%) of the through-wall depth.

If the N2-C DMW axial flaw had extended 100% through-wall during power operation and resulted in minor RCS leakage, control room monitoring of unidentified leakage and total leakage would have identified the condition. If the unidentified leakage rate increased beyond the JAF administrative limit of one-quarter (0.25) gpm an Operational Decision Making Issue (ODMI) item would have been initiated to establish actions that preclude degradation to a point where an unplanned power reduction or unexpected transient would become likely. If the unidentified leakage rate increased to more than two (2) gpm within a 24 hour period or greater than five (5) gpm total, a plant shutdown would have been performed in accordance with Technical Specification 3.4.4.

JAF is designed to withstand the consequences of major pipe break. The plant's design criteria ensures that the public is protected in accordance with 10CFR100 guidelines for pipe break events. Therefore, the identified flaw on the N2-C DMW nozzle safe-end was fully enveloped by the design analyses.

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SIMILAR EVENTS

There are no known similar events which have occurred at the JAF site.

REFERENCES

JAF Condition Report CR-JAF-2008-03311, Axial flaw indication on Reactor Vessel Nozzle Results in Degraded Condition.

Entergy Letter to NRC, JAFP-08-0099, "James A. FitzPatrick Request for Relief (RR-7) - Proposed Alternative to ASME Code Requirements for Weld Overlay Repairs", dated September 26, 2008

Entergy Letter to NRC, JAFP-08-0102, "James A. FitzPatrick Request for Relief (RR-7 Revision 1) - Proposed Alternative to ASME Code Requirements for Weld Overlay Repairs", dated October 1, 2008