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10 CFR 50.73

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U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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Dresden Nuclear Power Station, Unit 3
Facility Operating License No. DPR-25
NRC Docket No. 50-249

Subject: Licensee Event Report 2002-003-00, "Reactor Recirculation Loop A Sensing Line Socket Weld Vibration Fatigue Failure"

Enclosed is Licensee Event Report 2002-003-00 "Reactor Recirculation Loop A Sensing Line Socket Weld Vibration Fatigue Failure," for the Dresden Nuclear Power Station Unit 3. This event is being reported in accordance with 10 CFR 50.73(a)(2)(i)(A), "The completion of any nuclear plant shutdown required by the plant's Technical Specifications" and 10 CFR 50.73(a)(2)(ii)(A), "The condition of the nuclear power plant, including its principal safety barriers, being seriously degraded."

If you have any questions, please contact Jeff Hansen, Regulatory Assurance Manager at (815) 416-2800.

Respectfully,

R. J. Hovey
Site Vice President
Dresden Nuclear Power Station

Enclosure

cc: Regional Administrator – NRC Region III
NRC Senior Resident Inspector – Dresden Nuclear Power Station

IE22

NRC FORM 366 (7-2001)	U.S. NUCLEAR REGULATORY COMMISSION	APPROVED BY OMB NO. 3150-0104 EXPIRES 7-31-2004
LICENSEE EVENT REPORT (LER)		Estimated burden per response to comply with this mandatory information collection request: 50 hours Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U S Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@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 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.

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Dresden Nuclear Power Station Unit 3	05000249	1 of 4

4. TITLE Reactor Recirculation Loop A Sensing Line Socket Weld Vibration Fatigue Failure

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: N/A
10	08	2002	2002	– 003	– 00	12	09	2002	FACILITY NAME: N/A	DOCKET NUMBER: N/A

9. OPERATING MODE	1
10. POWER LEVEL	015

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)	X	50.73(a)(2)(i)(A)		50.73(a)(2)(v)(D)	
	20.2203(a)(2)(v)		50.73(a)(2)(i)(B)		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)	X	50.73(a)(2)(ii)(A)		50 73(a)(2)(viii)(B)	

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
Timothy P. Heisterman	(815) 416-2815

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

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 October 8, 2002, at approximately 0421 hours, with power being reduced for refueling outage D3R17, an inspection of the Dresden Nuclear Power Station (DNPS) Unit 3 drywell was performed. The inspection of the drywell was performed due to an increase in unidentified leakage on September 14, 2002. The leakage had increased from 0.2 gpm to approximately 0.65 gpm. During the inspection, the leak was identified on a one inch diameter piping socket weld associated with the Reactor Recirculation (RR) "A" loop low pressure flow venturi differential pressure sensing line. A Unit 3 shutdown was performed as required by Technical Specifications for primary pressure boundary leakage.

The root cause was attributed to an inadequate 1-1 axial leg socket weld (i.e. weld leg along the pipe side of the weld equal to the Code-required weld leg dimension) application in a system experiencing flow-induced vibration. The 1-1 axial leg socket weld was installed in 1985 as part of a major reactor recirculation piping replacement project. The weld was consistent with industry standards at the time of installation. Corrective actions include replacement of the Unit 3 RR Loop A high and low pressure venturi sensing line elbows and piping with a bent pipe configuration with no elbows. In addition, the installation of 2-1 axial leg socket welds (i.e. weld leg along the pipe side of the weld equal to twice the Code-required weld leg dimension) was performed on both the 3A and 3B RR Loop venturi sensing lines.

A. Plant Conditions Prior to Event:

Unit: 03 Event Date: 10-08-2002 Event Time: 0421 CDT
Reactor Mode: 1 Mode Name: Run Power Level: 017 percent
Reactor Coolant System Pressure: 926 psig

B. Description of Event:

This event is being reported in accordance with 10 CFR 50.73(a)(2)(i)(A), "The completion of any nuclear plant shutdown required by the plant's Technical Specifications" and 10 CFR 50.73(a)(2)(ii)(A), "The condition of the nuclear power plant, including its principal safety barriers, being seriously degraded."

On October 8, 2002, at approximately 0421 hours, with power being reduced for refueling outage D3R17, an inspection of the DNPS Unit 3 drywell was performed. The inspection of the drywell was performed due to an increase in unidentified leakage on September 14, 2002. The leakage had increased from 0.2 gpm to approximately 0.65 gpm. During the inspection a leak was identified on a one inch diameter piping socket weld associated with the Reactor Recirculation (RR) "A" loop low pressure flow venturi differential pressure sensing line. A Unit 3 shutdown was performed as required by Technical Specifications 3.4.4 for primary pressure boundary leakage. The piping was repaired/replaced per the Electrical Power Research Institute (EPRI) guidelines with the installation of 2-1 axial leg socket welds.

C. Cause of Event:

The root cause was high cycle fatigue failure due to an inadequate 1-1 axial leg socket weld application in a system experiencing flow-induced vibration. The 1-1 axial leg socket weld was installed in 1985 as part of a major reactor recirculation piping replacement project. The weld was consistent with industry standards at the time of installation. (NRC Cause Code B).

A contributing cause was a failure to properly address two previous high cycle fatigue weld failures and to build up the RR sensing line socket welds. Although the installation of tie-back supports to reduce vibration-induced stresses was performed during the previous outage (D3R16), a corporate and site engineering knowledge deficiency of a December 1999, EPRI report existed. Specifically, the EPRI Report TR-113890 recommendation to build up 1-1 axial leg socket welds to 2-1 axial leg socket welds was not implemented on the RR differential pressure sensing lines during the D3R16 refueling outage.

D. Safety Analysis:

The reactor pressure boundary leak was detected by the drywell leak monitoring system.
A failure of the instrument sensing line is bounded by the analyzed condition of a small break Loss-of-Coolant Accident (LOCA). This postulated failure would result in drywell high pressure, which would generate a reactor scram signal and initiation of the Emergency Core Cooling Systems (ECCS). The consequence of this accident would be mitigated by the High-Pressure Coolant Injection (HPCI) system or the Automatic Depressurization System (ADS) in conjunction with the Low Pressure Coolant Injection (LPCI) and Core Spray systems.

LPCI loop select logic was not affected by the RR venturi sensing line leakage. The LPCI loop selection logic ensures that LPCI injection flow is directed to an unbroken recirculation pump loop. Four differential pressure detectors compare the pressure between RR riser pipes in Loop A and the corresponding riser pipes in Loop B. If the Loop A pressure is greater than the loop B pressure, the logic selects Loop A for injection. If the Loop A pressure is not greater than the Loop B pressure, either RR Loop A is considered broken or neither RR loop is considered broken, a 1/2-second timer causes Loop B to be selected for injection. The minimal pressure drop in RR Loop A due to the failed socket weld was not sufficient to adversely affect the LPCI loop select logic.

The RR Loop A increase in flow indication and total reactor core flow was minimal due to the low pressure sensing line weld failure and had a negligible effect on reactor operating characteristics. Therefore, the consequences of this event had minimal impact on the health and safety of the public and reactor safety.

E. Corrective Actions:

Replaced the Unit 3 RR Loop A high and low pressure venturi sensing line elbows and piping with a bent pipe configuration with no elbows and replaced sixteen 1-1 axial leg socket welds with 2-1 axial leg socket welds.

Performed an ultrasonic examination of the RR loop B high and low venturi sensing line socket welds. Identified an indication on the tee connection and repaired the RR Loop B high pressure venturi sensing line tee weld indication with 2-1 axial leg socket welds.

Modified an additional twenty-six 1-1 axial leg socket welds on the Unit 3 RR Loop B high and low pressure venturi sensing lines to achieve 2-1 axial socket weld configurations.

Installed vibration monitors on the RR Loop A low pressure and RR Loop B high pressure sensing lines.

Thermal, modal and response spectra analysis was performed for the RR Loop A low pressure and modal and response spectra analysis was performed for the RR Loop B high pressure sensing line configurations. The following conclusions apply to both analyzed configurations and are consistently applicable to the remaining unanalyzed RR Loop A high pressure and RR Loop B low pressure sensing lines:

- The analysis results provide a relative comparison of the response of the sensing lines with and without the tie-back supports.
- Installing 2-1 axial leg socket welds, consistent with the results of the EPRI socket weld testing program is beneficial and necessary to compensate for the lack of operating vibrational data;
- Due to the constraint imposed by the tie-backs supports, additional thermal stresses are induced in the sensing lines. Detailed thermal stresses and fatigue analysis was performed for the RR Loop A low pressure sensing line and thermal stresses were found to be acceptable.

Performed an extent of condition review for DNPS Unit 2. Previous Unit 2 RR system walkdown observations and Dye Penetrant Tests (PT) found no evidence of piping degradation or leakage. Unit 2 has operated at nearly all the potential reactor recirculation pump speeds allowed. Additionally, the Unit 2 piping has not been replaced and thus piping design characteristics for Unit 2 are not the same as Unit 3. Therefore, it is reasonable to conclude that U2 is not susceptible to high-frequency, low-amplitude cyclic vibration. In conclusion, Unit 2 is not considered to be affected by this failure mode.

Developed and implemented a procedure for reviewing and disseminating new industry technical information.

F. Previous Occurrences:

On November 1, 1997, during inspection of the Unit 3 drywell for the source of a previously detected increase in unidentified leakage, a crack was discovered on a socket weld at a one inch tee fitting in the Reactor Recirculation Loop B High Pressure Flow Venturi Differential Pressure Sensing Line. A Unit 3 shutdown was performed as required by Technical Specification 3.6.H for primary pressure boundary leakage. This event was reported in LER 03-97-012.

On March 21, 1999, during inspection of the Unit 3 drywell for the source of a previously detected increase in unidentified leakage, a crack was discovered on the same socket weld at a one inch tee fitting on the Reactor Recirculation Loop B High Pressure Flow Venturi Differential Pressure Sensing Line. A Unit 3 shutdown was performed as required by Technical Specification 3.6.H for primary pressure boundary leakage. This event was reported in LER 99-003-00.

G. Component Failure Data:

N/A