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U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Dresden Nuclear Power Station, Unit 3
Facility Operating License No. DPR-25
NRC Docket No. 50-249

Subject: Licensee Event Report 2002-006-00, "Reactor Recirculation Loop A Sensing Line Socket Weld Failure"

Enclosed is Licensee Event Report 2002-006-00 "Reactor Recirculation Loop A Sensing Line Socket Weld 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."

Should you have any questions concerning this report, 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

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

LICENSEE EVENT REPORT (LER)

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 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	DOCKET NUMBER
									N/A	N/A
12	07	2002	2002	– 006 –	00	02	05	2003	FACILITY NAME N/A	DOCKET NUMBER N/A

9. OPERATING MODE	1
10. POWER LEVEL	021

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	
20 2203(a)(2)(iii)	50 46(a)(3)(ii)	50.73(a)(2)(v)(C)	Specify in Abstract below or in NRC Form 366A	
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 December 07, 2002, at approximately 0635 hours, with power being reduced to investigate previously detected and monitored elevated drywell unidentified leakage, an inspection of the Dresden Nuclear Power Station (DNPS) Unit 3 drywell was performed. 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 completed as required by Technical Specifications for primary pressure boundary leakage.

The root cause was attributed to mechanically induced residual pipe stresses due to the installation techniques performed on the reactor recirculation sensing line repair during the October 2002, Unit 3 refueling outage (D3R17) coupled with sensing line vibration, caused by resonance frequency with the RR pump speed. Corrective actions include minimizing the welding induced residual stresses by enhanced fit-up process and minimizing the mechanically induced stresses by proper tie-back support alignment in the repaired sensing line. An exclusion zone and action level values were established to minimize reactor recirculation pump speed in the area of the resonance frequency of the piping based upon a vibration monitoring plan implemented to monitor and document the RR Loop A low pressure and RR Loop B high pressure sensing line vibrations. A piping configuration modification will be installed to improve the vibration response characteristics of the Unit 3 RR Loop A and Loop B high and low pressure sensing lines.

A. Plant Conditions Prior to Event:

Unit: 03 Event Date: 12-07-2002 Event Time: 0635 CDT
Reactor Mode: 1 Mode Name: Run Power Level: 021 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 December 07, 2002, at approximately 0635 hours, with power being reduced to investigate a previously detected and continually monitored elevated drywell unidentified leakage, an inspection of the Dresden Nuclear Power Station (DNPS) Unit 3 drywell was performed. 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 completed as required by Technical Specifications for primary pressure boundary leakage.

The cause was determined to be mechanically induced residual pipe stresses coupled with sensing line vibration, caused by resonance frequency with the RR pump speed. During the forced outage (D3F41), the RR sensing line piping was repaired and the mechanical and welding induced residual stresses minimized by proper support alignment and through the use of additional tack welds during the piping fit-up. Analysis found that the RR Loop A low pressure sensing line horizontal section is excited at its resonance frequency at approximately 83 percent of RR pump rated speed. To minimize vibration, a monitoring plan with Action Level Values was developed and operation of the RR Loop A pump between 81.6 percent to 87.5 percent of pump rated speed is minimized and continuously monitored. During operation in the exclusion zone, if the sensing line accelerations exceed the Action Level Values, then the pump speed is promptly modified to exit the resonance region.

C. Cause of Event:

The root cause was determined to be mechanically induced residual pipe stresses due to the installation techniques performed on the reactor recirculation sensing line repair during the October 2002, Unit 3 refueling outage (D3R17), stresses coupled with sensing line vibration, caused by resonance frequency with the RR pump speed. The residual pipe stresses were attributed to welding techniques used during the socket weld fit-up, piping configuration misalignment during socket weld fit-up and tie-back support misalignment during piping installation. The flow induced vibration was caused by reactor recirculation loop A pump operation at or near the sensing line resonance frequency. (NRC Cause Code B)

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 flow indication and total reactor core flow impact due to the low pressure sensing line weld failure was minimal with regards to 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:

Corrective Actions Completed:

Minimized the welding induced residual stresses by enhanced fit-up process (i.e. four tack welds during fit-up)

Eliminated the mechanically induced stress by proper installation of piping configuration and tieback support alignment during repair of the sensing line socket weld.

Located accelerometers on the RR Loop A low pressure and RR Loop B high-pressure sensing lines.

Established an exclusion zone and action level values to minimize reactor recirculation pump speed in the area of the resonance frequency of the piping based upon a vibration monitoring implemented to monitor and document the RR Loop A low pressure and RR Loop B high pressure sensing line vibrations.

Lessons Learned Advisory was sent to all Exelon Site Welding Administrators providing additional detail on piping fit-up and tack welding of socket welded joints.

Corrective Actions to be Completed:

Revise welding procedure, CC-AA-501-1008, "Exelon Nuclear Welding Program Welding General Requirements," revision 0, to provide additional detail on piping fit-up and tack welding of socket welded joints.

Installation of a modification to improve the vibration response characteristics of the U3 RR Loop A and Loop B venturi flow element high and low pressure sensing lines.

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.

On October 08, 2002, during inspection of the Unit 3 drywell for the source of a previously detected increase in unidentified leakage, a steam leak was discovered on a socket weld at the socket fitting on the Reactor Recirculation Loop A Low 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 2002-003-00. The corrective actions to prevent recurrence were to modify the piping configuration to eliminate welds by installation of a bent pipe configuration and installation of 2-1 axial leg welds in lieu of 1-1 axial leg welds. Previous corrective actions to prevent recurrence were not effective due the residual stresses applied to the piping arrangement during installation and operation of the reactor recirculation pump at or near the resonance frequency of a vibration sensitive piping configuration.

G. Component Failure Data:

N/A