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Nuclear

10 CFR 50.73

SVPLTR # 09-0066

December 22, 2009

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

Dresden Nuclear Power Station, Unit 2  
Renewed Facility Operating License No. DPR-19  
NRC Docket No. 50-237

**Subject:** Licensee Event Report 237/2009-005-00, "Unit 2 Reactor Recirculation Drain Line Pressure Boundary Leakage"

Enclosed is Licensee Event Report 237/2009-005-00, "Unit 2 Reactor Recirculation Drain Line Pressure Boundary Leakage," for Dresden Nuclear Power Station, Unit 2. This event is being reported 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 regulatory commitments contained in this submittal.

Should you have any questions concerning this letter, please contact Ms. Marri Marchionda at (815) 416-2800.

Respectfully,



Tim Hanley  
Site Vice President  
Dresden Nuclear Power Station

Enclosure

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

JEDJ  
NRC

# LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

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.

<b>1. FACILITY NAME</b> Dresden Nuclear Power Station, Unit 2	<b>2. DOCKET NUMBER</b> 05000237	<b>3. PAGE</b> 1 OF 4
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**4. TITLE**  
Unit 2 Reactor Recirculation Drain Line Pressure Boundary Leakage

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
11	03	2009	2009	- 005 -	00	12	22	2009	N/A	N/A
									FACILITY NAME	DOCKET NUMBER
									N/A	N/A

<b>9. OPERATING MODE</b>  5	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §:</b> (Check all that apply)							
<b>10. POWER LEVEL</b>  000	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)				
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input checked="" type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)				
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)				
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)				
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)				
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)				
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)				
	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER				
	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A				

**12. LICENSEE CONTACT FOR THIS LER**

FACILITY NAME Dresden Nuclear Power Station – R. Ruffin	TELEPHONE NUMBER (Include Area Code) (815) 416-4834
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**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
N/A					N/A				

<b>14. SUPPLEMENTAL REPORT EXPECTED</b> <input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	<b>15. EXPECTED SUBMISSION DATE</b>	MONTH	DAY	YEAR

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

On November 3, 2009 during a walkdown of the Unit 2 Drywell, plant personnel identified leakage from the above seat drain line for the 2B Reactor Recirculation Pump discharge valve. The water was flowing from a weld in a 3/4 inch line between a coupling and a socket-welded elbow. The diameter of the steady stream was approximately the size of a toothpick. The plant had been shutdown and the reactor vessel had been depressurized to commence refueling activities at the time of the discovery. Prior to the discovery of this condition, there was no abnormal indication in drywell leakage.

This condition represents degradation to a principal safety barrier of the Nuclear Power plant.

The through-wall leak was caused by fatigue cracking resulting from cyclic torsional loads of the cantilever connection most likely due to increased reactor recirculation pump vibrations. The leaking drain line was cut and capped.

The plant's emergency core cooling systems were available during this condition. Therefore the safety significance of this event is minimal due to the health and safety of the public not being compromised.

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(LER)**

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**NARRATIVE**

**PLANT AND SYSTEM IDENTIFICATION**

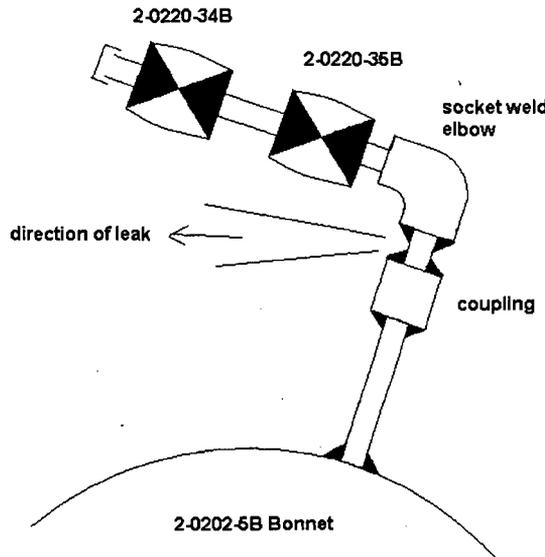
Dresden Nuclear Power Station (DNPS) Unit 2 is a General Electric Company Boiling Water Reactor with a licensed maximum power level of 2957 megawatts thermal. The Energy Industry Identification System codes used in the text are identified as [XX].

**A. Plant Conditions Prior to Event:**

Unit: 02	Event Date: 11-03-2009	Event Time: 0445 hours CST
Reactor Mode: 5	Mode Name: Refueling	Power Level: 000 percent

**B. Description of Event:**

On 11/03/2009 at approximately 0445 hours plant personnel were performing a walkdown of the Unit 2 drywell. The walkdown was being performed as a part of the refueling outage activities. During the walkdown a leak was identified coming from the above seat drain line for the 2-0202-5B, 2B Reactor Recirculation Pump Discharge Valve [AD]. A steady stream of water was leaking from a 3/4 inch line between a coupling and a socket-welded elbow. The diameter of the water leak was approximately the size of a toothpick.



Jet pump plugs were installed and the 2B reactor recirculation loop was drained to accommodate repairs to the leaking line. Upon examination of the leaking component, it was identified that the through-wall leak was caused by a fatigue crack that initiated from the upper side of the pipe OD between the coupling and the elbow socket-weld toes.

This condition represents degradation to a principal safety barrier of the Nuclear Power plant

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**C. Cause of Event:**

Based on the examination of the failed component, two indications were identified. The larger circumferential indication extended 150 degrees. The through-wall portion extended approximately 85 degrees. The second indication was smaller and was not through-wall. Observing the fracture radial markings, the larger indication initiated from the outer diameter of the pipe. Microscopic examination revealed the cracking propagated in a non-branching transgranular manner, which was indicative of fatigue. The smaller indication initiated from the toe of the coupling weld.

The angled nature of the cracking near the origin indicated that the pipe was subjected to cyclic torsional loads, which would be consistent with cantilever loading induced by the weight of the two downstream valves. Likely causes of the cyclic loading include a known period when the 2B Reactor Recirculation pump experienced higher than normal vibrations or possibly a periodic resonance condition associated with intermediate pump operating speeds.

The 2-0202-5B Recirculation Pump Discharge Valve above seat drain line is connected to the top of the bonnet of the valve, which is located approximately 3 feet from the discharge nozzle of the 2B Reactor Recirculation pump. During pump operation the discharge piping experiences flow induced vibration from the high velocity fluid, pump impeller vane pass frequency, and vibration from the operating pump. The 2B Recirculation pump began experiencing increased vibrations in late 2005, 2006 and 2007, which resulted in Recirculation pump seal leaks. This was caused by degradation in the pump hydrostatic bearing, resulting in axial shuttling and increased axial vibrations.

A review of the weld size from the failure report indicates that, while the weld meets minimum code requirements for a socket weld in this configuration, the proportions are such that it is susceptible to weld toe fatigue failure when subjected to a high vibration environment. Additionally, this type of geometry, with two welds nearly touching, is a stress intensifier. This configuration is seen as a contributing cause as it created a point of stress intensification.

**D. Safety Analysis:**

Reactor makeup capability was not affected and was available to provide adequate flow to compensate for the leaking drain line. Emergency Core Cooling Systems were operable and capable of performing their intended safety functions during the time that the leak existed. Therefore, the safety significance of this event is minimal due to the health and safety of the public not being compromised.

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**Corrective Actions:**

The 2B Reactor Recirculation pump internals were replaced in 2007 which reduced the amount of vibration associated with pump operation.

The leaking above seat drain line was cut and capped. This arrangement results in a vibration tolerant configuration.

Non-destructive examinations were conducted on welds in the below seat drains for the 2-0202-5A and 2-0202-5B valves. No additional indications were identified.

A walkdown of Unit 2 Recirculation system accessible small bore piping connections confirmed that no other close weld geometry existed.

A walkdown of Unit 2 Recirculation system accessible small bore piping confirmed that no other unsupported cantilever connections exist.

A walkdown of Unit 3 Recirculation system accessible small bore piping connections is scheduled to be performed to ensure that no other close weld geometry exist.

A walkdown of Unit 3 Recirculation system accessible small bore piping is scheduled to be performed to ensure that no other unsupported cantilever connections exist.

**F. Previous Occurrences:**

A review of DNPS Licensee Event Reports (LERs) was performed and the following events were identified.

- Licensee Event Report 249/2002-003-00, "Reactor Recirculation Loop A Sensing Line Socket Weld Vibration Fatigue Failure"
- Licensee Event Report 249/2002-006-00, "Reactor Recirculation Loop A Sensing Line Socket Weld Vibration Fatigue Failure"

**G. Component Failure Data:**

N/A