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Designated Original

10 CFR 50.73

SVPLTR # 07-0031

July 3, 2007

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

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

Subject: Licensee Event Report 237/2007-002-00, "Unit 2 Reactor Scram due to Loss of Feedwater"

Enclosed is Licensee Event Report 237/2007-002-00, "Unit 2 Reactor Scram due to Loss of Feedwater," for Dresden Nuclear Power Station, Unit 2. This event is being reported in accordance with 10 CFR 50.73(a)(2)(iv)(A), "Any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B)."

Should you have any questions concerning this report, please contact Mr. James Ellis, Regulatory Assurance Manager, at (815) 416-2800.

Respectfully,

David B Wozniak for

Danny G. Bost
Site Vice President
Dresden Nuclear Power Station

Enclosure

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

Rec'd 10/5/07

IE22
NRR

NRC FORM 366 (6-2004) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 06/30/2007

Estimated burden per response to comply with this mandatory 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 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)

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

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
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4. TITLE
Unit 2 Reactor Scram due to Loss of Feedwater

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
05	04	2007	2007	- 002 -	00	07	03	2007	N/A	N/A
									FACILITY NAME: N/A	DOCKET NUMBER: N/A

9. OPERATING MODE
1

10. POWER LEVEL
100

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: *(Check all that apply)*

- ☐ 20.2201(b)
- ☐ 20.2201(d)
- ☐ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☐ 50.73(a)(2)(i)(A)
- ☐ 50.73(a)(2)(i)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(A)
- ☐ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☒ 50.73(a)(2)(iv)(A)
- ☐ 50.73(a)(2)(v)(A)
- ☐ 50.73(a)(2)(v)(B)
- ☐ 50.73(a)(2)(v)(C)
- ☐ 50.73(a)(2)(v)(D)
- ☐ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☐ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- ☐ OTHER

Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
Dresden Nuclear Power Station – George Papanic Jr.	(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
NA					NA				

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 May 4, 2007, at 2305 hours (CDT), with Unit 2 at approximately 100 percent power, Dresden Nuclear Power Station control room personnel noted decreasing reactor water level and manually scrammed the reactor. All controls rods inserted into the core. The decreasing reactor water level was due to a loss of feedwater transient caused by an unexpected closure of all Unit 2 Condensate Prefilter System valves. Prior to this event, technicians were replacing a failed Condensate Prefilter System Central Processing Unit card. The High Pressure Coolant Injection System was utilized to restore reactor water level. During the event, the Main Steam Isolation Valves closed, the Reactor Recirculation Pumps were tripped and the Unit 2 and 3 Emergency Diesel Generators automatically started as designed. Unit 2 was restored to the electrical grid at 1638 hours (CDT) on May 8, 2007.

The root cause of the unexpected closure of all Unit 2 Condensate Prefilter System valves and the subsequent loss of feedwater transient was a vendor latent software deficiency that caused the valves to close when the new Condensate Prefilter Central Processing Unit card was energized. The corrective actions to prevent reoccurrence are to proceduralize the requirements for performing Condensate Prefilter System troubleshooting, maintenance and system restoration; and to develop a design specification for the Condensate Prefilter System Central Processing Unit software.

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

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: 5-4-2007
Reactor Mode: 1 Mode Name: Power Operation Power Level: 100 percent
Reactor Coolant System Pressure: 1000 psig

B. Description of Event:

On May 4, 2007, at 2305 hours (CDT), with Unit 2 at approximately 100 percent power, DNPS control room personnel noted decreasing reactor water level and manually scrammed the reactor. All controls rods inserted into the core. The decreasing reactor water level was due to a loss of feedwater transient caused by an unexpected closure of all Unit 2 Condensate Prefilter System valves. Prior to this event, technicians were replacing a failed Condensate Prefilter System [SD] Central Processing Unit (CPU) card. The High Pressure Coolant Injection System [BJ] was utilized to restore reactor water level. During the event, the Main Steam Isolation Valves [V] closed, the Reactor Recirculation Pumps [AD] were tripped and the Unit 2 and 3 Emergency Diesel Generators [EK] automatically started as designed.

An ENS call was made on May 5, 2007, at 0113 hours (CDT) for the above-described event. The assigned ENS event number was 43346.

Unit 2 was restored to the electrical grid at 1638 hours (CDT) on May 8, 2007.

This event is being reported in accordance with 10 CFR 50.73(a)(2)(iv)(A), "Any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B)." The event included the manual actuation of the Reactor Protective System.

C. Cause of Event:

The root cause of the unexpected closure of all Unit 2 Condensate Prefilter System valves and the subsequent loss of feedwater transient was a vendor latent software deficiency that caused the valves to close when the new Condensate Prefilter System CPU card was energized.

Pre-operational testing in 2001 of the Unit 2 Condensate Prefilter System identified the system was not operating as expected as the system periodically initiated auto-bypassing the Condensate Prefilters from power supply perturbations. DNPS requested the software contractor to perform a software revision to alleviate the power supply perturbation effects. Based on the Exelon request, a contractor programmer performed a logic change which implemented the "0-1" logic for Condensate Prefilter System valve alignment. This revision utilized registers for valve position with zero for closed and non-zero for open. The revised software retained a memory of the valve positions prior to the

momentary power interruption, and upon power restoration, sends a signal to align the valves to the last-known position. The original intent of the software revision performed as designed since implementation in 2001 as demonstrated by the periodic soft reboots to reset the CPU.

The investigation of this event identified the programmer implementation of the "0-1" logic for valve alignment introduced an unrecognized latent software deficiency under which all valves could be sent a closed signal. The latent software deficiency was not apparent during the post-modification testing and normal system operation, including CPU re-boots. The condition only manifests when the all CPU registers contain a "0" resulting from a lack of previous valve positions in the CPU memory. All registers would contain a "0" when a new CPU card is installed. The vendor was unaware of the existence of the software deficiency until discovered during the post-analysis of this event.

DNPS operations personnel on May 5, 2007 identified during operator rounds, that the Unit 2 Condensate Prefilters were bypassed. Further investigation identified the Unit 2 Condensate Prefilter System CPU card had failed. DNPS initiated work to replace the CPU card. This was a first time evolution, as the Condensate Prefilter System CPU card had not been replaced since initial system startup. Upon energizing the CPU card, all the Condensate Prefilter System valves were given a closed signal due to the new CPU registers all containing a "0." The closure of all Condensate Prefilter System valves caused a loss of feedwater transient and the resulting need to manually scram the reactor.

An extent of condition review identified that the Unit 3 Condensate Prefilter System and the Station Black Out Diesel (SBO) Generator are affected by a similar latent software deficiency. Corrective actions from this event will address the Unit 3 Condensate Prefilter System. Based on the SBO being in a standby mode, any risk associated with online replacement of the CPU is minimal, as it would only be replaced during standby operation followed by an operability startup and testing. Failures under this condition have no operational impact on a system required for plant operation.

D. Safety Analysis:

The safety significance of the event is minimal. All control rods inserted as a result of the scram and all systems responded as required. A loss of feedwater event is an analyzed transient in the DNPS Updated Final Safety Analyses Report in Section 15.2.7, "Loss of Normal Feedwater Flow," and is classified as a moderate frequency event. Therefore, the consequences of this event had minimal impact on the health and safety of the public and reactor safety.

E. Corrective Actions:

The corrective actions to address this event include the following actions.

DNPS has proceduralized the requirements for performing Condensate Prefilter System troubleshooting, maintenance and system restoration.

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

DNPS will develop a design specification for the Condensate Prefilter valve CPU software.

DNPS will evaluate a configuration change to the Condensate Prefilter System software that opens the bypass valves on low feedwater flow.

F. Previous Occurrences:

A review of DNPS Licensee Event Reports (LERs) for the last three years did not identified any LERs associated with latent software deficiency.

G. Component Failure Data:

NA