November 29, 1993

GFSLTR 93-0142

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for 11-29-93

Gary F. Spedl
Station Manager
Dresden Station

GFS:slb

Enclosure

cc: J. Martin, Regional Administrator, Region III
NRC Resident Inspector's Office
File/NRC
File/Numerical

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LICENSEE EVENT REPORT (LER)

Form Rev 2.0

Facility Name (1)	Docket Number (2)	Page (3)
Dresden Nuclear Power Station, Unit 2	0 5 0 0 0 2 3 7	1 of 0 5

Title (4)

Main Steam Line Isolation Valves 2-203-2A and 2-203-1D As-Found Leakage Rates Exceeded the Technical Specification Limit of 11.5 scfh

Event Date (5)			LER Number (6)			Report Date (7)			Other Facilities Involved (8)	
Month	Day	Year	Year	Sequential Number	Revision Number	Month	Day	Year	Facility Names	Docket Number(s)
1 0	3 0	9 3	9 3	--- 0 2 6	--- 0 0	1 1	2 9	9 3	N/A	

OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIRMENTS OF 10CFR (Check one or more of the following) (11)									
POWER LEVEL (10)	0 0 0		20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)	
			20.405(a)(1)(i)		50.36(c)(1)		50.73(a)(2)(v)		73.71(c)	
			20.405(a)(1)(ii)		50.36(c)(2)		50.73(a)(2)(vii)		Other (Specify in Abstract below and in Text)	
			20.405(a)(1)(iii)	X	50.73(a)(2)(i)		50.73(a)(2)(viii) (A)			
			20.405(a)(1)(iv)		50.73(a)(2)(ii)		50.73(a)(2)(viii)(B)			
			20.405(a)(1)(v)		50.73(a)(2)(iii)		50.73(a)(2)(x)			

LICENSE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
M. McGivern, Local Leak Rate Test Coordinator Ext. 2526	AREA CODE 8 1 5 9 4 2 - 2 9 2 0

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
X	S B	I S V	C 6 6 5	Yes					

SUPPLEMENTAL REPORT EXPECTED (14)			Expected Submission Date (15)	Month	Day	Year
	Yes (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

At approximately 2330, on October 30, 1993 with Unit 2 shutdown for maintenance, the performance of Dresden Technical Surveillance DTS 0250-01, Main Steam Isolation Valve Local Leak Rate (Dry) Test, identified the "A" Main Steam Line Isolation Valves (MSIVs) to be leaking 31.81 scfh. Technical Specifications states that primary containment leakage rates shall be limited to 11.5 scfh for any Main Steam Isolation Valve (MSIV) at a test pressure of 25 psig. Dresden Technical Surveillance DTS 0250-03, Main Steam Isolation Valve Local Leak Rate (Wet) Test identified that the majority of the leakage (30.25 scfh) was from the Outboard MSIV 2-203-2A. This valve had been repaired during the previous Unit 2 Refueling Outage D2R13. It was determined that the other Main Steam Lines which had seat ring work during the previous refuel outage ("C" and "D") would also be tested to identify any leakage. Results of both wet and dry LLRTs showed that the Inboard MSIV 2-203-1D, which also had seat ring repairs during the D2R13 outage, leaked 135.4 scfh. The safety significance of the leakage past the 2A and 1D MSIVs was considered to be minimal, since the redundant MSIVs leaked 1.56 scfh and 3.2 scfh respectively. The leakage out of containment from MSIVs, as determined on a minimum pathway basis, would not cause the maximum off-site dose rates established in 10 CFR 100 to be exceeded in the event of a LOCA. Final LLRTs after disassembly, inspection and repair of these MSIVs yielded 0.10 scfh leakage for the "A" MSIVs and 8.8 scfh leakage for the "D" MSIVs.

PLANT AND SYSTEM IDENTIFICATION:

General Electric-Boiling Water Reactor-2527 MWt rated core thermal power.

Nuclear Tracking System (NTS) tracking code numbers are identified in the text as (XXX-XXX-XX-XXXXX).

EVENT IDENTIFICATION:

Main Steam Line Isolation Valves 2-203-2A and 2-203-1D As-Found Leakage Rates Exceeded the Technical Specification Limit of 11.5 scfh

A. CONDITIONS PRIOR TO EVENT:

Unit: 2 Event Date: October 30, 1993 Event Time: 2330 hrs

Reactor Mode: N Mode Name: Refuel Power Level: 0%

Reactor Coolant System Pressure: 0 psig

B. DESCRIPTION OF EVENT:

At approximately 1400, on October 29, 1993 with Unit 2 shutdown for maintenance, the Inboard Main Steam Line Isolation Valve (MSIV) 2-203-1A Actuator was found to have an air leak. Upon replacement of the actuator, the performance of Dresden Technical Surveillance DTS 0250-01, Main Steam Isolation Valve Local Leak Rate (Dry) Test, identified the "A" Main Steam Line Isolation Valves (MSIVs) to be leaking 31.81 scfh. Technical Specification 3.7.A.2.b(2)(c) states that primary containment leakage rates shall be limited to 11.5 scfh for any Main Steam Isolation Valve at a test pressure of 25 psig. Since DTS 0250-01 challenges the integrity of both the inboard and outboard MSIVs, Dresden Technical Surveillance DTS 0250-03, Main Steam Isolation Valve Local Leak Rate (Wet) Test, must be performed to quantify the leakage past the outboard MSIV. Knowing the outboard MSIV leakage, this value can be subtracted from the leakage of both the inboard and outboard MSIVs to obtain the inboard MSIV's leakage. DTS 0250-03 identified that the majority of the leakage (30.25 scfh) was from the Outboard MSIV 2-203-2A. The Shift Engineer was notified that the leakage rate for the Outboard 2A MSIV had exceeded the Technical Specification limit of 11.5 scfh, and a Problem Identification Form (PIF) was initiated per Dresden Administrative Procedure (DAP) 02-27, Integrated Reporting Process. Work Request (WR) D22561 was written to inspect and repair the valve in order to reduce leakage.

During the previous Unit 2 Refueling Outage D2R13, the Outboard 2A MSIV had been repaired after failing its as-found LLRT. The valve body seat ring was lapped and a thin layer of stellite seating material still remained. The valve was returned to service with the knowledge that the seat ring was to be replaced after the next operating cycle.

The determination was then made that the other Main Steam Lines which had valve body seat ring work during the previous refuel outage ("C" and "D") would also be tested to identify any leakage. Results of both wet and dry LLRTs showed that the Inboard MSIV 2-203-1D, a valve which had seat ring repairs during the D2R13 outage, leaked 135.4 scfh. The "C" Main Steam Line was also tested but did not yield any failures. The Shift Engineer was notified and another PIF was then

initiated for the Inboard 1D MSIV. Work Request (WR) D22627 was written to inspect and repair the valve in order to reduce leakage.

Since the Main Steam system had been placed in a line-up for testing, the "B" Main Steam Line was local leak rate tested and was found acceptable.

In parallel with MSIV valve internal repair work, an investigation of the air leak on the failed MSIV actuator was performed. All eight MSIV actuators were found to be missing a part of the seal on the underneath side of the pneumatic piston. A PIF was written and Work Requests submitted to repair the MSIV actuators.

In addition, per vendor recommendation, MSIV closing springs were replaced with springs of a higher compression factor in order to provide a stronger closing force. This stronger closing force will provide improved disk seating capabilities which in turn provides improved primary containment integrity.

C. APPARENT CAUSE OF EVENT:

This report is being submitted in accordance with 10 CFR 50.73(a)(2)(i) which requires the reporting of any operation or condition prohibited by the Technical Specifications.

During the last Unit 2 refuel outage, D2R13, MSIV 2-203-2A failed its as-found LLRT (LER 93-003/0500237). Upon opening the valve , it was found that three of the four lower guide liner to body bore retaining welds were cracked. These three cracked welds had been excavated and fillet welds applied. The seat ring, which exhibited wear, was lapped and valve internals replaced. After the failed LLRT, under Work Request D22561, the 2A MSIV was disassembled and the valve internals inspected. 2A MSIV's body seat ring and disk seating surface both exhibited an area of non-contact as shown by a break in the contact wear mark. The seat ring showed light gray longitudinal tracking (leakage paths) on the seating surface between 3 o' clock and 6 o' clock positions. The hard faced seating stellite was lapped off in some areas of the seat ring. This combined with impingement of the seat ring by saturated steam produced increased erosion of the stellite from the seat ring and thus a leakage path.

The inspection also revealed that a recently replaced valve stem was severely scored. The scoring was 10 inches in length (axially), 2 inches wide (one quarter of the circumference) and 20 thousandths of an inch deep. An area of the backseat corresponding to that afore mentioned scoring on the valve stem also showed significant wear. Upon zero line verification, it was discovered that the lower guide liner and the valve body bore (thus the valve bonnet\backseat) were not concentric but rather misaligned by 48 thousandths of an inch. In addition, when the lower liner was later removed, dimensional verification revealed that the seat ring center was offset 25 thousandths of an inch with the body bore center line. Vendor drawings require a concentricity of 10 thousandths of an inch. This misalignment between the valve body, lower guide liner and seat ring caused improper seating of the disk.

During the last Unit 2 refuel outage, D2R13, the 1D MSIV had been disassembled due to an increasing trend in leakage (LER 93-003/0500237). That inspection revealed wear of the seat ring. Valve internals were replaced and the seat ring was lapped to obtain a uniform seating surface.

After the failed leakage test, under Work Request D22627, the 1D MSIV was disassembled and the valve internals inspected. Measurements showed that all dimensions were within the ranges specified by vendor drawings. However, acid etching of the seat ring (acid is applied to the seating surface and reacts with the base metal (carbon steel) turning it a rust color) showed that the hard faced seating material (stellite) was practically non-existent. This accelerated erosion of the seating material is from saturated steam impingement on a seat ring with an non-uniform, thin layer of stellite present.

D. SAFETY ANALYSIS OF EVENT:

The safety significance of the leakage past Main Steam Line Isolation Valves 2-203-2A and 2-203-1D was considered to be minimal since the redundant Main Steam Line Isolation Valves leaked 1.56 scfh and 3.20 scfh respectively. Therefore, the total leakage out of the penetrations, on a minimum pathway basis, was 4.76 scfh. The current as-left leakage (Type A test) is .6706 wt%/day. If the minimum pathway leakage of the Main Steam penetrations, .0094 wt%/day (4.76 scfh), is added to the current as-left minimum pathway leakage total (.6706 wt%/day), then the new total leakage would be .6800 wt%/day. Since this total is still less than the Technical Specification limit of $0.75L_a$ (1.2 wt%/day), the maximum off-site dose rates established in 10 CFR 100 would not be exceeded in case of a LOCA.

E. CORRECTIVE ACTIONS:

Since the 2A MSIV had little stellite remaining on the seat ring, the decision was made to change out the seat ring and lower guide assembly. The four lower guide liner to body bore welds were machined out and the liner removed. After the lower guide line was removed, dimensional verification discovered that the seat ring center was offset from the body bore centerline by 25 thousandths of an inch. The seat ring to body seal weld was mechanically removed with a boring bar and the seat ring removed. Then an eighth of an inch of valve body was cut out in the area of the seat ring for establishment of the correct centerline. Once the weld overlay was complete, a boring bar created a new centerline consistent from the valve bonnet to the seat ring. The new seat ring and lower guide liner were then welded in and lapped as necessary to obtain a uniform seating surface. The repairs were performed to ASME Section XI criteria. Upon completion of the MSIV assembly, actuator repairs and closing spring replacements, the final as-left LLRT was performed on November 23, 1993 and yielded a leakage of 0.1 scfh. The only other leakage failure for this valve is the afore mentioned failure in early 1993 during D2R13.

Since the 1D MSIV had little stellite remaining on the seat ring, the decision was made to change out the seat ring and lower guide assembly. The four lower guide liner to body bore welds were machined out and the liner removed. After the lower guide line was removed, dimensional verification was performed and verified valve internal concentricity was acceptable. The seat ring to body seal weld was mechanically removed with a boring bar and the seat ring removed. The new seat ring and lower guide liner were then welded in by a robotic welding machine. The seating surface was then lapped as necessary to obtain a uniform seating surface. The repairs were performed to ASME Section XI criteria. Upon completion of the MSIV assembly, actuator repairs and closing spring replacements, the final as-left LLRT was performed on November 22, 1993 and yielded a leakage of 8.8 scfh.

This valve had two previous LLRT failures in 1988 and 1990. The first was attributed to poor seating capabilities and repairs included lapping of the seat ring. The second failure was attributed to a worn upper guide liner which did not allow the disk to seat properly. Repairs included replacement of valve internals.

The long term corrective action to prevent valve leakage due to poor seating capabilities is to repair/replace the valve seat ring and lower guide liner for a minimum of two MSIVs each refuel outage until all 8 MSIVs have been upgraded. This will be performed on both Unit 2 and Unit 3 (237-180-93-02601A and 237-180-93-02601B).

Both the "B" and "C" Main Steam Lines had final LLRTs after the MSIV actuators were repaired and the closing springs replaced. The results were 10.42 scfh and 4.62 scfh respectively.

F. PREVIOUS OCCURRENCES:

LER/Docket Numbers	Title
88-018/0500237	Leak Rate Limits Exceeded in Drywell Head Seal and MSIV 2-203-1D Tests Due to Misalignment and Seat Wear
93-003/0500237	Outboard Main Steam Line Isolation Valve 2-203-2A As Found Leakage Rate Exceeded the Technical Specification Limit of 11.5 scfh

G. COMPONENT FAILURE DATA:

Manufacturer	Nomenclature	Model Number	Mfg. Part Number
Crane Co.	Main Steam Line Isolation Valves 2-203-2A and 2-203-1D	Y-Pattern Globe	N/A

An industry - wide data base search revealed twelve failures for the Crane Company Y-Pattern Globe Valve utilized in Main Steam Systems. Two failures were attributed to wear of valve internals.