



LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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TEXT Energy Industry Identification System (EIIS) codes are identified in the text as [XX]

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:

Failure of The Outboard Drywell Air Sample [IK] Valve 2-8501-5B During its 24-Month Local Leak Rate Testing Surveillance Due to Improper Valve Seating

A. CONDITIONS PRIOR TO THE EVENT:

Dresden Unit: 2                      Event Date: September 28, 1992                      Event Time: 1910 hours  
 Reactor Mode: N                      Mode Name: Run                      Power Level: 94%  
 Reactor Coolant System (RCS) Pressure: 994.9 psig

B. DESCRIPTION OF EVENT:

At approximately 1910 hours on September 28, 1992 with Unit 2 at 94% power, the performance of Special Procedure 92-9-115 Revision 0 (Local Leak Rate Testing of Primary Containment Isolation Valves [JM] During Reactor Operation) identified the Outboard Drywell Air Sample Valve 2-8501-5B to be leaking 74.28 scfh. This leakage, when added to the total primary containment maximum pathway leakage obtained through Type B and C local leak rate testing, did not exceed the Technical Specification maximum pathway leakage limit of 0.6L<sub>a</sub> (488.45 scfh). However, an Administrative limit of 85% of 0.6 L<sub>a</sub> (415.18 scfh) was exceeded since the sum of this new leakage rate caused the total Type B and C leakage rate to be 435.64 scfh. This administrative limit was established as a condition of being granted a one-time schedular exemption from the 24-month Unit 2 Type B and C local leak rate test interval required by 10 CFR 50; Appendix J.

Upon identification of the excessive leakage, the Station Control Room Engineer (SCRE) was notified of the event and the Inboard Drywell Air Sample Valve 2-8501-5A was requested to be closed. In order to verify that primary containment integrity could still be maintained, Outboard Drywell Air Sample Valve 2-8501-5B was opened and leakage past valve 2-8501-5A was quantified by performing an additional local leak rate test. The local leak rate test on Inboard Drywell Air Sample Valve 2-8501-5A yielded a leakage rate of 2.20 scfh. The new sum of this pathway's leakage rate, when added to the current sum of Type B and C leakage, caused the new total leakage rate to be 363.56 scfh. The SCRE was notified that with valve 2-8501-5A closed, primary containment integrity could be maintained. At 1910 hours on September 28, 1992 Outboard Drywell Air Sample Valve 2-8501-5B was declared inoperable and Inboard Drywell Air Sample Valve 2-8501-5A was administratively taken Out-Of-Service in the closed position. This ensured that primary containment integrity could be maintained by preventing the inadvertent opening of the inboard valve. A courtesy ENS red phone notification was made at 2006 hours on September 28, 1992 to provide notification that the administrative limit for maximum pathway primary containment leakage, established in the schedular exemption granted by NRR, had been exceeded.

Work Request (WR) 12542 was previously submitted on September 18, 1992 to reduce the leakage past valve 2-8501-5B since the as-left leakage rate obtained during the D2R12 Refuel Outage was 4.0 scfh. This work request was upgraded to a B1 priority on September 28, 1992. A work analyst began preparing a package to repair valve 2-8501-5B that evening.

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On October 2, 1992 maintenance was completed on valve 2-8501-5B. The valve actuator spring and diaphragm were replaced and the spring tension required to open the valve was reset. On October 6, 1992 an as-left local leak rate test was performed. This local leak rate test yielded a successful leakage rate of 3.24 scfh. The valve was tested for proper stroke time and work package 12542 was approved for completion. Valve 2-8501-5B was declared operable and returned to service at 1830 hours on October 6, 1992.

An additional valve failure was identified on December 11, 1992 with Unit 2 shutdown for a maintenance outage. At approximately 1805 hours, the performance of Dresden Technical Surveillance (DTS) 1600-01 revision 15 (Local Leak Rate Testing (LLRT) of Primary Containment Isolation Valves) identified the Drywell Pneumatic Supply [LD] Check Valve, 2-4799-530, to be leaking an undetermined amount. This leakage exceeded the maximum pathway leakage limit of 0.6La (488.452 scfh) established in Technical Specification 3.7.A.2.b(2)(a). The leakage rate for this volume was reduced to 5.8 scfh when the vent path downstream of 2-4799-530 was isolated. The Shift Engineer and the SCRE were notified of the event and Work Request 14718 was written to reduce the leakage past the check valve.

On December 12, 1992 Mechanical Maintenance inspected, cleaned, and performed a seat contact check on the valve. The contact check indicated complete seat contact; however, a portion of the seating surface did not indicate strong contact. The valve was assembled and an informational LLRT was performed. This test yielded an unsatisfactory leakage rate of 84.6 scfh. The check valve was replaced and a final post-maintenance leakage rate of 13.0 scfh was obtained.

Subsequent local leak rate testing during the maintenance outage identified the Atmosphere Containment Atmosphere Dilution (ACAD) system [BB] Outboard Check Valves 2-2599-23B and 2-2599-24B to be leaking an undetermined amount. When the vent paths downstream of the check valves were isolated, the leakage rates were reduced to 0.0 scfh for the 2-2599-23B volume and to 0.18 scfh for the 2-2599-24B volume. The Shift Engineer and the SCRE were notified of the events and work requests 14748 and 14750 were written to inspect and repair check valves 2-2599-23B and 2-2599-24B.

Both ACAD check valves were disassembled and inspected on December 12, 1992. The valves were cleaned, cycled, and reassembled. Post-maintenance leak rate tests yielded leakage rates of 2.2 scfh for the 2-2599-23B volume and 0.82 scfh for the 2-2599-24B volume.

C. APPARENT CAUSE OF EVENT:

This report is being submitted since both the Technical Specification limit of 0.6La (488.452 scfh) and the administrative limit of 85% of 0.6 La was exceeded during the operating cycle. The administrative limit was established as a condition for being granted a one-time scheduler exemption from the 24-month Type B & C local leak rate test interval required by 10 CFR 50, Appendix J.

The root cause of the unsatisfactory leakage past Outboard Drywell Air Sample Valve 2-8501-5B is under investigation. Local leak rate testing records dating back to 1983 indicate no previous failures of valve 2-8501-5B. In addition, maintenance records indicate that no repairs have been performed on the valve or operator.

An inspection of the Drywell Pneumatic Supply Check Valve, 2-4799-530, revealed that the seating surfaces were dirty and had become oxidized. The Mechanical Maintenance Department cleaned the seats of the valve and checked the seat contact with a bluing compound. The seat contact check revealed that a section of the valve seating surface did not indicate strong contact. The check valve inspection and contact check determined the leakage to be caused by debris preventing the check valve to close and oxidation causing the seating surfaces to wear and cause a pathway for leakage. The root cause for the source of the debris and oxidation can be attributed to system conditions (debris from within the piping and system humidity).

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The ACAD Check Valves 2-2599-23B and 2-2599-24B were inspected to determine the cause of the leakage. Both check valves are a lift-type and were found with their pistons corroded to the guide. The seat on the piston of the 2-2599-23B valve was found to be satisfactory; however, the seat in the body was corroded and covered with debris. Both the piston and the valve body seats were found to be corroded and covered with debris on the 2-2599-24B valve. The cause of each valve failure was due to the corroded piston not allowing the valve to close properly. The cause of the corrosion, which prevented the piston from moving freely, is from moist air, originating from the torus, drywell, and ACAD compressor, condensing in the lines. Neither the check valves nor the attached piping is heat traced.

A supplement to this report will be provided by June 1, 1993 to identify the cause of the failure of the 2-8501-5B valve and any additional valves which fail during the course of the Unit 2 exemption period.

D. SAFETY ANALYSIS OF EVENT:

The safety significance of the Outboard Drywell Air sample Valve 2-8501-5B failure is considered minimal since the Inboard Drywell Air Sample valve 2-8501-5A had a measured leakage rate of 2.20 scfh. Therefore, when adding the minimum pathway leakage rate of this pathway (2.20 scfh) to the current sum of Type B and C leakage, a combined leakage rate of 363.56 scfh would be obtained. This leakage rate is well below the leakage rate limits used in calculating the maximum off-site dose rates established in 10 CFR 100. If the maximum pathway leakage rate for this pathway (74.28 scfh) were added to the current sum of Type B and C leakage, a combined leakage rate of 435.64 scfh would be obtained. This leakage rate would also be well below the leakage rate limits used in calculating the maximum off-site dose rates established in 10 CFR 100.

Likewise, the safety significance of the leakage past check valves 2-4799-530, 2-2599-23B, and 2-2599-24B is also considered minimal since their redundant isolation valves 2-4722, 2-2599-2B, and 2-2599-3B had leakage rates of 5.8 scfh, 0.0 scfh, and 0.18 scfh, respectively. Therefore, the actual through-leakage out of the primary containment pathways would also be below the amount used in calculating the maximum off-site dose rates established in 10 CFR 100.

E. CORRECTIVE ACTIONS:

The immediate corrective action for the repair of valve 2-8501-5B was to verify that the spring actuator provided the required closing force needed to isolate flow. This was accomplished by replacing and adjusting the actuator spring to the vendor specification. The original spring will be tested to determine if there was any degradation.

Drywell Pneumatic Supply Check Valve 2-4799-530 was inspected, cleaned, and had a seat contact check performed. An informational local leak rate test was performed and yielded a leakage rate of 84.6 scfh. The check valve was then replaced and a final post-maintenance leakage rate of 13.0 scfh was obtained. Work Request 14796 was initiated to replace the valve with a safety-related valve specifically designed to seal against low pressure air. These valves will be installed during the D2R13 and D3R13 refuel outages (237-180-92-26001-S1). Previous local leak rate test data back to 1983 indicate no failures for either Unit 2 or Unit 3.

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ACAD Check Valves 2-2599-23B and 2-2599-24B were inspected and cleaned. Post-maintenance leak rate tests were performed and yielded leakage rates of 2.2 scfh for the 2-2599-23B volume and 0.82 scfh for the 2-2599-24B volume. Local leak rate testing records dating back to 1983 indicate five failures between the 8 check valves in service in the Unit 2 and Unit 3 ACAD Systems. In order to reduce the number of failures for this valve application, the replacement of this carbon steel valve with one which is less susceptible to corrosion (stainless steel) will be evaluated.

A supplement to this report will be submitted by June 1, 1993 to identify the cause of the 2-8501-5B failure, and any long-term corrective actions for the 2-8501-5B, 2-2599-23B, and 2-2599-24B failures. This supplement will also address any other valve failures which occur during the course of the Unit 2 exemption period (237-180-92-26001-S2).

F. PREVIOUS EVENTS:

The most recent occurrences in which the primary containment Type B and C Leakage totals exceeded the Technical Specification Limits, and the ACAD check valves contributed significantly to the leakage, are documented in the following Licensee Event Reports.

LER NUMBER      TITLE

88-018-1      Leak Rate Limits Exceeded.

Valve 2-8501-5A was disassembled and inspected under Work Request 80052. Upon disassembly, foreign material was found on the seating surface. The valve seat was lapped and the valve internals cleaned. Upon valve reassembly, a final LLRT was performed yielding a leakage rate of 0.20 scfh.

88-018-1      Leak Rate Limits Exceeded.

Check Valve 2-2599-23B was disassembled and inspected per Work Request 79715. Upon disassembly, the valve plug was found stuck in the open position. The valve internals were cleaned and proper operation of the valve plug was verified prior to reassembly.

91-007      Type B & C Containment Local Leak Rate Testing Limit Exceeded.

Check Valve 3-2599-24A was disassembled and inspected under Work Request 03765. Corrosion was identified on the valve guide and seats. The valve internals were cleaned and the seating surfaces polished. The valve stroked freely after cleaning.

88-004      Type B and C Local Leak Rate Test Limit Exceeded Due to Leakage Through Primary Containment Isolation Valves.

The cause of the excessive leakage from the ACAD Check Valve 3-2599-23B has been attributed to a small amount of foreign material on the valve seating surfaces coupled with slightly worn valve seats. The valve was cleaned and the seating surfaces were lapped.

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G. COMPONENT FAILURE DATA:

An industry wide-Nuclear Plant Reliability Data System (NPRDS) data base search revealed seven reported failures for the Crane Model 76E check valve. Six of the failures were caused by abnormal wear, and one failure was caused by improper maintenance. All valves with failures reported were used as discharge check valves for diesel generator starting air compressors and not as containment isolation valves.

An industry-wide NPRDS data base search revealed twenty-one reported failures for the Hancock Model 5580 check valve. Four failures were attributed to corrosion, causing the plug to sieze in the open position. None of the failures reported were used in similar system applications.

Component failure data for valve 2-8501-5B will be included in the supplemental report.