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RLB-89-245

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U.S. Nuclear Regulatory Commission
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Reference: Quad-Cities Nuclear Power Station
Docket Number 50-265, DPR-30, Unit Two

Enclosed please find Licensee Event Report (LER) 87-012, Revision 01, for Quad-Cities Nuclear Power Station. This revision provides an update regarding cause and corrective actions.

This report is submitted in accordance with the requirements of the Code of Federal Regulations, Title 10, Part 50.73(a)(2)(ii), which requires the reporting of any event or condition that resulted in the condition of the nuclear power plant, including its principal safety barrier, being seriously degraded.

Respectfully,

COMMONWEALTH EDISON COMPANY
QUAD-CITIES NUCLEAR POWER STATION

R. L. Bax
Station Manager

RLB/MJB/e

Enclosure

cc: R. Stols
R. Higgins
INPO Records Center
NRC Region III

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LICENSEE EVENT REPORT (LER)

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| Facility Name (1) QUAD-CITIES NUCLEAR POWER STATION, UNIT TWO | | | | | | Docket Number (2) 0 5 0 0 0 2 6 5 1 | | | Page (3) 1 of 0 6 | | | |
| Title (4) Update on Suppression Chamber to Drywell Vacuum Breaker Failure to Close Due to Test Cylinder Binding | | | | | | | | | | | | |
| 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) | |
| 0 9 | 1 8 | 8 7 | 8 7 | 0 1 2 | 0 1 | 1 0 | 3 0 | 8 9 | | | 0 5 0 0 0 1 1 | |
| OPERATING MODE (9) 4 | | | THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11) | | | | | | | | | |
| POWER LEVEL (10) 0 9 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) | | | 50.73(a)(2)(i) | | | 50.73(a)(2)(viii)(A) | | | |
| | | | 20.405(a)(1)(iv) | | | X 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)(ix) | | | |
| LICENSEE CONTACT FOR THIS LER (12) | | | | | | | | | | | | |
| Name Suzette Cravens, Technical Staff Engineer, Extension 2144 | | | | | | TELEPHONE NUMBER AREA CODE 3 0 9 6 5 4 - 2 2 4 1 | | | | | | |
| 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 | B F | V T V | A 5 B 5 | Y | | | | | | | | |
| SUPPLEMENTAL REPORT EXPECTED (14) | | | | | | | | | Expected Submission Date (15) | | | |
| [Yes (If yes, complete EXPECTED SUBMISSION DATE)] X NO | | | | | | | | | | | | |
| ABSTRACT (Limit to 1400 spaces, i.e. approximately fifteen single-space typewritten lines) (16) | | | | | | | | | | | | |

On September 18, 1987, Quad Cities Unit Two was in the RUN mode at 90 percent of core thermal power. At 1300 hours, while performing QOS 1600-1 (Suppression Chamber to Drywell Vacuum Breakers Monthly Exercise), the 2-1601-33E vacuum breaker remained open after testing. Efforts were directed at reclosing the vacuum breaker. At 1350 hours, these efforts were successful. Because of the stuck open vacuum breaker, NRC notification had been completed at 1346 hours. Position indication problems were also identified for vacuum breakers 2-1601-32A and 33A. Suppression chamber to drywell differential pressure was reestablished at 1725 hours.

The cause of the 2-1601-33E failure was determined to be due to binding in the test cylinder portion of the vacuum breaker. This is considered an isolated event and does not affect the operation necessary to mitigate the consequences of a loss of coolant accident. The position indication problems on 2-1601-32A and 33A should be corrected upon completion of modification M-4-1(2)-88-009 which is the result of the inspection and evaluation performed on Unit One's vacuum breakers. This report is submitted per 10 CFR 50.73(a)(2)(ii).

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At 0550 hours, electrical blocks (numbers 3954 and 3955) were installed to allow resetting the vacuum breaker position annunciator alarms on the 902-3 panel in the control room, and to clear the red "open" lights at the local control panel 2252-24. At 0825 hours, testing resumed per QOS 1600-1. Vacuum breakers 2-1601-32B through F operated satisfactorily but vacuum breaker 2-1601-33A, also indicated dual position on Division I following the testing. At 0900 hours, the separation test (QOS 1600-27) was performed again successfully to satisfy Specification 3.7.A.4.b. referenced above and Specification 3.7.A.4.c. which states:

"reactor operation may continue provided that no more than one quarter of the number of pressure suppression chamber-drywell vacuum breakers are determined to be inoperable provided that they are secured or known to be in the closed position."

Both the 2-1601-32A and 33A were known to be in the closed position because the separation test was successfully performed. There are twelve suppression chamber-drywell vacuum breakers and only two were displaying indication problems. At 1140 hours, electrical blocks (numbers 3956 and 3957) were installed to reset the annunciator alarms on the 902-3 panel and to clear the red "open" light at the local control panel.

Subsequently, testing per QOS 1600-1 resumed and at 1300 hours, vacuum breaker 2-1601-33E stuck fully open when tested. Attempts were initiated immediately to reclose the vacuum breaker. These efforts included further manipulations of the vacuum breaker test pushbutton and isolation of the air supply to the vacuum breaker test solenoid.

At 1346 hours, the NRC was notified via the Emergency Notification System (ENS) to satisfy the requirements of 10 CFR 50.72(b)(1)(ii) because of the stuck open vacuum breaker. However, at 1350 hours, as a result of the continuing efforts to close the 2-1601-33E vacuum breaker, the vacuum breaker was closed. Then the drywell-suppression chamber dp restoration was begun.

At 1630 hours it was apparent that the drywell-suppression chamber dp restoration was not proceeding normally, so the nine vacuum breakers that were considered available were cycled again to ensure that they were all reseated. All but the 2-1601-32A, 33A and 33E were cycled. As a result, dp buildup was improved and at 1703 hours, the dp of 1.2 psid required by Technical Specification 3.7.A.6.a. was established. This Specification states that:

"differential pressure between the drywell and suppression chamber shall be maintained at equal to or greater than 1.20 psid except this differential may be decreased to less than 1.20 PSID for a maximum of 4 hours during required operability testing of the HPCI system pump, the RCIC system pump, the drywell-pressure suppression chamber vacuum breakers, and reactor pressure relief valves.

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If the Specifications of 3.7.A cannot be met, and the differential pressure cannot be restored within the subsequent six (6) hour period, an orderly shutdown shall be initiated and the reactor shall be in a cold shutdown condition in the following 24 hours."

At 1725 hours, the separation test (QOS 1600-27) was completed satisfactorily. The dp was lost at 1300 hours when the 2-1601-33E was tested and stuck open. By 1703 hours the dp was reestablished. As a result, only 4 hours and 3 minutes of the six hours allowed by the Technical Specification were exhausted.

C. APPARENT CAUSE OF EVENT:

This report is submitted to comply with 10 CFR 50.73(a)(2)(ii), which requires the reporting of any event or condition that resulted in the condition of the nuclear power plant, including its principal safety barriers, being seriously degraded.

The apparent cause for the 2-1601-33E vacuum breaker initial failure to close was due to binding of the test cylinder. Furthermore, vacuum breaker 2-1601-33A position indication limit switches required adjustment.

D. SAFETY ANALYSIS OF EVENT:

The 2-1601-33E vacuum breaker is one of twelve vacuum breakers that are provided to relieve noncondensables to the drywell from the suppression chamber. The capacity of the vacuum breakers is designed to limit the dp between the drywell and suppression chamber to 0.5 psi to maintain the structural integrity of the containment. The design flow can be achieved with 25 percent of the vacuum breakers closed without exceeding the 0.5 psi differential pressure limit.

In the event of a Loss of Coolant Accident (LOCA) with the suppression chamber to drywell vacuum breakers stuck open, some of the steam created by the LOCA would flow from the drywell to the suppression chamber atmosphere through the vacuum breaker, resulting in incomplete condensation of the steam during the blowdown. This would raise the suppression chamber pressure above the pressure as analyzed with all vacuum breakers closed. Two design features assist with resolution of this equipment problem:

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1. The high velocity steam passing through the valve would tend to close the valve.
2. Steam which would be passed through the unclosed valve could be condensed through the use of the Suppression Pool Spray subsystem of the Residual Heat Removal [BO] system.

Station management discussed the problem with this vacuum breaker and concluded that based on the indications observed while trying to reclose the valve, it was apparent that the problem was with the air operator portion of the valve. Each time the vacuum breaker test button was operated (given an open signal) from the local control panel, it took longer to have the green "closed" indication go out. Since the air operator is for test purposes only and does not perform any function when the valve operates as a vacuum breaker, it was agreed that the 2-1601-33E would still perform as required during a LOCA.

As a precautionary measure, this vacuum breaker was declared inoperable (but only for testing) per QOS 1600-02 (Suppression Chamber-Drywell Vacuum Breakers Inoperable).

Because the 2-1601-32A showed dual indication in both Division I and II position indicating and alarm systems, it was declared inoperable per QOS 1600-2. The safety significance of this condition was minimal because this vacuum breaker and the 2-1601-33A were still capable of performing their function during a LOCA. Vacuum breaker position indication is to provide indication that valve opening exceeds the equivalent of 1/16 inch at all points along the seal surface of the disk. (T.S. 3.7.A.4.a.3) Closure integrity of all valves is assured by satisfactory completion of the separation test (QOS 1600-27). The vacuum breakers were tested every 15 days in accordance with Technical Specification 3.7.A.4.d which states:

"if failure occurs in one of the two-position alarm systems for one or more vacuum breakers, reactor operation may continue provided that a differential pressure decay rate test is initiated immediately and performed every 15 days thereafter until the failure is corrected."

The testing was performed satisfactorily on 10/02/87, 10/17/87, and 11/01/87.

E. CORRECTIVE ACTION:

Nuclear Work Requests Q60285, Q60288, and Q60289 were completed and the testing was satisfactorily completed by November 5, 1987. Vacuum breakers 2-1601-32A and 33E test cylinder lever arm and valve disc arm were adjusted. Additionally, the 2-1601-33E test cylinder was rebuilt. Vacuum breakers 2-1601-32A and 33A position indication limit switches were adjusted.

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The problem that caused the 2-1601-33E to stick open is considered an isolated event. The dual indications present on vacuum breakers 2-1601-32A and 33A is considered to be primarily indication problems. Correction of the indication problem will be accomplished under modification M-4-1(2)-88-009. The modification will provide a more reliable method of position indication by placing the CLOSED position indication switches at the bottom of each vacuum breaker body. Completion of the modification is being tracked with Nuclear Tracking System (NTS) 2652008800101 for Unit Two and 2542008800503 for Unit One. This modification is the result of the inspection and evaluation performed on Unit One during its last refuel and maintenance outage.

F. PREVIOUS EVENTS

Licensee Event Report (LER)

Description

265/87-004

2-1601-33A failed to close due to dimpled bushing and/or corroded solenoid.

Reportable Occurrence

Description

265/82-22/03L

2-1601-33A
Stainless steel packing and stuffing box bushing bound to the shaft caused failure to close.

265/82-06/03L

2-1601-32C counterweight mispositioned.

G. COMPONENT FAILURE DATA:

The vacuum breakers are 18 inch swing-check valves manufactured by Atwood and Morrill Company, Incorporated. The air test cylinder is manufactured by Atwood and Morrill, model number 20781-F.