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NOTE FOR: Themis P. Speis

FROM: Arthur Buslik

SUBJECT: INTERIM REPORT ON HPCI/RCIC/RWCU LINE BREAK IN SHOREHAM REACTOR BUILDING

This note gives a summary of the status of work related to HPCI/RCIC/RWCU line breaks in Shoreham reactor building, and gives our plan for addressing this issue. We understand that Harold Denton may wish to be briefed on this progress. The concern is that the isolation valves in these lines may not be able to close under blowdown conditions. Generally speaking, they have not been qualified for these conditions.

(1) Current Knowledge

(i) We estimate that the core-vulnerable frequency due to HPCI/RCIC line breaks is about 2×10^{-7}/reactor-year, even if the inboard isolation valve fails to isolate. The contribution of the HPCI line break dominates; the RCIC line is of only 3" diameter; the operator has more time to depressurize the reactor and recovery is more likely.

(ii) The outboard isolation valves are normally closed at Shoreham, while in most BWRs the outboard isolation valves are open. Moreover, the piping between the two isolation valves at Shoreham is of "break-exclusion" type, and is assumed to have an order of magnitude lower failure probability than other primary piping. The estimate of the core-vulnerable frequency at Shoreham due to a HPCI line break takes into account these two considerations.

(iii) We note that the BNL analysis of the HPCI line break gives credit for use of the condensate system. The condensate system is estimated to have a 20% chance of failure for these sequences. The possibility of the break causing failure of the ability to use the condensate system was investigated. The only identified dependency was the effect of the steam environment on the motor control centers (MCCs) for valves in the feedwater line; these MCCs are located in the reactor building annulus. However, it was found that these MCCs would very likely not be affected. They are at a higher elevation than the HPCI line; they are on two opposite sides of the containment; and they are in enclosed cubicles, and are protected from the environmental conditions in the reactor building, according to information obtained by BNL and verified in an informal conference call between the staff and LILCO on January 31, 1985.

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(iv) Except for MSIVs, qualification of an isolation valve to determine its ability to close under blowdown conditions is generally not done by test, as far as we know. In response to ACRS questions on valve qualification, Hope Creek recently submitted a data sheet from a valve closure test conducted by Wyle Laboratories. The test data indicated that the valve was capable of closing in about 2 seconds against a differential pressure of 1370 psig. The test demonstrated that the valve differential pressure was never as large as the initial upstream pressure during the closing cycle. This introduced further margin. However, no tests or analysis under blowdown conditions have been performed for these valves. For Limerick, the valves were shown by analysis to be capable of closing during blowdown conditions.

For Shoreham, we have obtained the test data for closing the HPCI and RCIC isolation valves. The tests were performed by the valve vendor, Velan Engineering Company. The test data for the RCIC isolation valves indicated that these valves closed in about 16 seconds under a differential pressure of 1135 psig. The test data for the HPCI isolation valves indicated that, under a differential pressure of 1135 psig, the HPCI inboard isolation valve closed in about 17 seconds and the HPCI outboard isolation valve closed in 44 seconds. LILCO is still trying to retrieve test data on RWCU isolation valves and the procedures for testing HPCI/RCIC/RWCU isolation valves from Velan. We have received no schedule from LILCO as to when they will submit this test data and procedures to us. We will ask Equipment Qualification Branch (EQB) to review this information in order to determine if the valves can close under blowdown conditions.

(2) Planned Future Efforts

The preliminary BNL review of the Shoreham PRA study did not explicitly address the RWCU line break because the RWCU line is 6" in diameter and is much smaller than the HPCI line which is 10" in diameter. If a RWCU line break occurs, there is more time for the operator to take recovery action. However, the RWCU line is always open, so that the advantage of a closed outboard isolation valve, as is the case with the HPCI line, is lost.

BNL is pursuing this issue. Furthermore, BNL is examining other line breaks in the reactor building in addition to breaks in HPCI, RCIC and RWCU. We believe that in general the other lines are less than 4" in diameter and there would be greater time for the operator to take recovery action. We have expanded the BNL contract effort to devote more manpower and resources to this issue. BNL will perform sensitivity analysis and provide estimates of core-vulnerable frequencies due to these breaks, assuming that the isolation valves fail to isolate during blowdown conditions (the probability of the valve failing to close is assumed to be 1). We expect BNL to complete this effort by March 8, 1985.

In addition to the sensitivity studies, our program of effort includes assessing whether the valves can close under blowdown conditions. The schedule for this

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depends on when LILCO submits the test data and procedures; the length of time needed by EQB to perform the review will depend on the nature of the material submitted.

/S/

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