Enclosure 2

Safety Evaluation Report

Single Failure Problem for Crossover Valves In

Turkey Point Units 3 and 4

Issue

A single failure mode has been identified[1] in Turkey Point Units 3 & 4 which could degrade the performance of the low pressure injection system during the injection phase of a large LOCA.

Two parallel motor-operated valves (863 A&B) connect the discharge lines of the RHR pumps with the suction of the high pressure injection pumps. During the recirculation phase of a LOCA, these valves are opened to supply sump water through the RHR pumps to the SI system. The valves are also opened to allow hot leg injection during the long term after a LOCA. Otherwise the valves are closed.

If, however, either valve is inadvertently opened during the injection phase of a LOCA, the RHR pump discharge would be partially diverted from the primary coolant system. The licensee has proposed a method of preventing inadvertent actuation of the valves[2,3]. With the valves in the closed position, motive power to the motor operators would be removed by locking open the appropriate circuit breakers in the motor control centers. This is an effective method which has been used extensively to protect against valve single failure problems.

However, there is a potential problem with the use of this procedure for valves 863 A&B and several other valves (862 A&B and 864 A&B) which are already locked in the open position in the same way. All of these valves are required to operate during switchover from injection to recirculation during a LOCA. By locking out power at the motor control centers, a situation is created in which operator action outside of the control room is required to reinstate power. Branch technical position ICSB 18 (PSB)[4] precludes removal of power from valves in this manner unless power can be restored from the main control room.

Evaluation

To approve the continuation of a situation in which power is removed from active valves at the motor control centers, the NRC must be satisfied that (1) the procedure for reinstating power is effective and unambiguous, (2) the motor control centers are in an easily accessible area not affected by the accident environment, (3) the time required to reinstate power does not introduce any appreciable delay in switchover to recirculation and (4) positive indication of valve position is maintained in the control room.

The procedure for reinstating power during a LOCA must have the following elements; (a) a nuclear or nuclear turbine operator must be assigned to each of the two Motor Control Centers such that successful action on the part of either operator is sufficient to allow switchover to recirculation, (b) these operators should be dispatched to their respective MCC's as soon as a LOCA has been identified, (c) they should have no other responsibilities until switchover to recirculation is

complete (d) power should not be reinstated until the low level (115,000 gal) on the RWST is reached and (e) this procedure should be emphasized in the training and requalification of nuclear operators and nuclear turbine operators.

The Motor Control Centers are located two flights of stairs below central control room, at ground level in the auxiliary building. The breakers are in an accessible location. It is not likely that an operator would encounter radiation or other adverse environmental conditions in or on the way to the MCC's. There is emergency lighting and the noise level is sufficientlty low to allow ease of communication with the control room. Redundant, diverse and independent means of communication with the control room are available[5].

Time response criteria for safety related operator actions have been estimated in a draft ANSI standard[6]. The document is intended for review of future designs of nuclear plants. Although the document is not intended for evaluation of operating reactors, the time response criteria are useful. According to ANSI N660 (draft), no operator action should be assumed until 20 minutes after the start of a LOCA. Each discrete action taken thereafter should be assumed to require one minute. The licensee estimates that it would take 2 minutes for the operator to reach the MCC's, in the worst case. If they started 20 minutes[7] after the LOCA they would arrive at the MCC's two minutes later and would require three minutes to reinstate the three breakers. Thus power would be available to the valves 25 minutes after start of the LOCA. Using the same criteria, the control room operator would not

start to convert to recirculation until 20 minutes after the LOCA starts. His first actions (at one minute each) would involve turning off the safety injection pumps, RHR pumps and containment sprays. The power would not be required for these valves until 28 minutes into the accident, and consequently no delay in switchover to recirculation would be introduced by the operation of reinstating power [8].

Currently, the control room does not receive a positive position indication for valves whose power has been removed to prevent a single failure problem. This omission represents a potential single-failure problem in itself. If the position of one of these valves were to be manually changed at some time after power is removed, the control room would have not indication of the realignment. Consequently, it is a requirement of branch technical position ICSB 18 (PSB)[4] that redundant position indication be provided in the control room for all such valves.

In order to assure that the valves are properly aligned for ECC injection, the licensee must provide for continuous positive indication for all valves in question. Furthermore, when power to valves 863 A&B is removed, the plant operational staff shall visually verify the proper position of valves 862 A&B, 863 A&B and 864 A&B.

Conclusion

The proposed modifications [2,3] to the technical specifications for Turkey Point Units 3 and 4 constitute a safe method of eliminating the single failure problem, provided that the procedures for removing and reinstating power conform to the requirements stated above, and provided

that positive position indication for all the valves in question is maintained in the control room.

References and Footnotes

1. A. Schwencer (ORB #1) letter to D. G. Eisenhut, Assistant Director for Systems and Projects, "Single Failure On Turkey Point Units 3&4," June 22, 1978.

2. R. E. Uhrig (FP&L) letter to V., Stello (NRC), L-78-233, July 11, 1978.

3. R. E. Uhrig (FP&L) letter to V. Stello (NRC, L-78-262, August 9, 1978.

4. M. Srinivasan (PSB) memo to T. P. Speis, (DSI), August 13, 1981.

5. Telephone conversation; S. Verducci, P. Pace, R. Goldie, J. Balaquerro (FP&L) and R. Barrett, D. McDonald (NRC), August 27, 1982.

   Telephone Conversation; S. Verducci (FP&L) and D. McDonald (NRC), September 2, 1981.

   Written confirmation of the relevant information from these conversations has been requested of the licensee.

6. American National Standard (Draft), "Time Response Design Criteria

for Safety Related Operator Actions," ANSI N660, March 1981.

7. A strict interpretation of ANSI N660 would not take credit for operator action outside the control room until 30 minutes after the start of a LOCA. That requirement is ignored here because of the proximity of the MCC's to the control room.

8. The actual procedures for switchover to recirculation have not been reviewed. This SER should not be interpreted as approval for the emergency procedures at Turkey Point.

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Principal Contributor:
R. Barrett