



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED AMENDMENT NO. 18 TO FACILITY OPERATING LICENSE NO. NPF-85
PHILADELPHIA ELECTRIC COMPANY
LIMERICK GENERATING STATION, UNIT 2
DOCKET NO. 50-353

1.0 INTRODUCTION

By letter dated March 3, 1992, the Philadelphia Electric Company (PECo or the licensee) submitted a request for changes to the Limerick Generating Station, Unit 2, Technical Specifications (TS). The requested changes would provide a one-time revision to the TS to extend the allowed outage time for the Emergency Core Cooling Systems (ECCS) supported by the "B" loop of the Emergency Service Water (ESW) system. This change would only be in effect during the Spring 1992 refueling outage of Limerick, Unit 1, and would allow for continued operation of Limerick, Unit 2, while repairs and modifications are made on the "B" loop of ESW.

2.0 DISCUSSION

By letter dated December 9, 1992, PECo advised the NRC staff that they had found a through wall (i.e., pin-hole) leak in a section of 3" diameter ESW system piping that services the Limerick Generating Station (LGS), Unit 1 High Pressure Coolant Injection (HPCI) room unit coolers. The leak is in the pipe leading from the outlet of the HPCI room unit coolers to the common Unit 1/Unit 2 ESW return header. The portion of ESW piping containing the leak is carbon steel and cannot be isolated. PECo proposed to leave the flawed section of pipe "as-is" and to monitor the leak in accordance with the guidance in Generic Letter (GL) 90-05. PECo proposed to repair or replace the flawed section of pipe during the Unit 1 refueling outage which started March 21, 1992. The reason for PECo wanting to leave the leak "as-is" was that in order to perform a permanent repair in accordance with the American Society of Mechanical Engineers (ASME), Boiler and Pressure Vessel (B & PV) Code, Section XI, both Limerick units would have had to be shutdown to comply with TSS, since Code repair activities would render a number of ECCS components inoperable. Commission approval was required to continue operation since leaving the pipe "as-is" is not a Code qualified repair. By letter dated February 26, 1992, the Commission granted relief from the ASME Code with the provision that the flawed pipe be repaired or replaced in accordance with the Code during the current Unit 1 refueling outage.

As noted above, Unit 1 is currently shutdown for refueling. However, as discussed later, the "B" loop of the ESW system cools some components in Unit 2 as well as Unit 1 during a postulated Loss of Offsite Power (LOOP) condition or a postulated Loss of Coolant Accident (LOCA). The present TSs (TS Section 3.0.3) would normally require that the unit (in this case, Unit 2) be in at least startup within 6 hours when the "B" loop of ESW is determined to be inoperable. To replace the leaking section of piping to comply with our letter of February 26, 1992 will require more than 6 hours. While the repairs are being made, the "B" loop of ESW will not fully meet all operability requirements. PECO is requesting a one-time change (i.e., temporary) to TS Section 3.7.1.2 to extend the present 6 hour limit to avoid a Unit 2 shutdown.

3.0 EVALUATION

At Limerick, the service water (SW) system supplies cooling water required for normal plant operation, circulating the water from the two cooling towers, through the various heat exchangers and back to the cooling towers. The SW system has no safety related function. The ESW system is a safety related system and is designed to supply cooling water to selected equipment during a LOOP condition or LOCA and to the Emergency Diesel Generator (EDG) heat exchangers. A simplified schematic for the ESW system is attached. The system is common to Units 1 and 2 and consists of two independent loops (A and B) with two 50% system capacity (100% loop capacity) pumps per loop. The pumps take suction from the spray pond, circulate the water through the various heat exchangers and return it to the spray pond. Besides the EDGs, the ESW supplies cooling water to the Core Spray (CS), Residual Heat Removal (RHR), High Pressure Coolant Injection (HPCI) and Reactor Core Isolation Cooling (RCIC) pump compartment unit coolers and some other coolers. The ESW system is described in detail in Section 9.2.2 of the Updated Final Safety Analysis Report (UFSAR).

The above equipment is provided with cooling water from either ESW loop A or B. Each diesel generator can be supplied with cooling water from ESW loop A or loop B. Normal system alignment, however, is such that loop A supplies cooling water to the A and C diesel generators, and loop B supplies the B and D diesel generators.

The licensee has proposed that TS Section 3.7.1.2, Action a.3, be temporarily amended such that a 72-hour period is authorized for continued operation of Unit 2 although the equipment supported by the "B" loop of ESW will be considered inoperable during this 72-hour period. This one-time TS change is requested to avoid a Unit 2 shutdown. TS Section 3.0.3 would normally require that the unit be in at least startup within 6 hours when the "B" loop of ESW is determined to be inoperable. This proposed change is necessary in order to complete the repair to the ESW pipe section without being required to shut down Unit 2 since it cannot be isolated from the remainder of the "B" loop of ESW common piping.

The strategy for the ESW pipe repair is to establish freeze seals at the appropriate locations in the "B" loop of ESW piping such that work can be accomplished while the "B" loop remains available for use (i.e., after the freeze seals are established). Although freeze seals do not provide an ASME Code approved pressure boundary such that the "B" loop of ESW can be considered operable, a level of confidence exists from experience that the loop would be available if required to support ECCS or EDG operation since the "B" loop of ESW pumps will remain in standby after the freeze seals are established. The "B" loop of ESW will be declared inoperable once the freeze seal process is initiated.

As noted previously, the leak is in the 3" pipe leading from the outlet of HPCI room unit coolers to the common Unit 1/2 ESW return header. The repair will be accomplished under Modification 6207, which will install isolation capability to this section of ESW piping as well as upgrade the piping material. Specifically, modification No. 6207 involves the replacement of approximately 180 feet of flawed 3 inch diameter carbon steel ESW piping from the Unit 1 HPCI Room Unit Coolers discharge isolation valve to the common 8 inch return header piping connection. This new pipe material will be a special type of austenitic stainless steel which is very resistant to microbiologically induced corrosion (MIC) consisting of a nominal 25% nickel, 20% chromium and 6% molybdenum of the same diameter and thickness as the existing pipe. The replacement pipe will follow the same pipe routing utilizing all existing restraints to maintain seismic qualification. In addition, modification No. 6207 will install a manual 3 inch valve near the 8 inch return header which will provide isolation capability for this section of ESW piping during future maintenance activities. The first action under the 72 hour Allowed Outage Time (AOT) authorized by the TS change is to install and seismically mount the isolation valve so as to restore the "B" loop of ESW to full operability for Unit 2.

The licensee has stated that the systems relied upon for accident mitigation during the proposed AOT shall be operable at the start of and during the 72-hour period. If any of the operable Unit 2 ECCS or EDGs are rendered inoperable during the proposed 72-hour AOT, then the action statement in TS Section 3.0.3 shall be implemented, i.e., immediate plant shutdown will be started. Prior to the start of the 72-hour AOT, the licensee will check the operability of the three offsite power sources and check that there is no scheduled maintenance that would take one of the incoming transmission lines out of service. The licensee will also verify the operability status of the EDGs.

During the 72-hour AOT, at least two (2) Unit 2 EDGs that are normally aligned to the "A" loop of ESW will remain operable. The minimum requirements for long-term accident response are: one ECCS pump (CS or Low Pressure Coolant Injection (LPCI)) for reactor vessel level control and one decay heat removal loop, consisting of an RHR pump, an RHR Service Water (RHRSW) pump and one RHR heat exchanger. These requirements are met by equipment serviced by the operable "A" loop of ESW.

The ESW system has other functions which support ECCS and post accident response systems such as indirectly cooling emergency switchgear rooms via the room chillers. One loop of ESW is sufficient to provide enough room cooling for half of the ECCS, by design. The availability of the RHR "B" and "D" and CS pumps is still maintained short term (i.e., several hours) without ESW cooling. The rooms have temperature instrumentation that will give Operations personnel indication of a room cooling problem. Actions specified in approved procedures would then be taken to lessen the temperature in the rooms in which cooling capability was lost (e.g., opening doors). Several hours are available before operators would have to take action to preclude overheating the rooms.

In the event of a LOCA on Unit 2 with a temporarily degraded ECCS (i.e., a reduction in the redundancy of operable ECCS due to the inoperability of the "B" loop of ESW), the conclusion that the unit can be safely shutdown, the vessel reflooded, and adequate core cooling provided is obtained from NEDO-24708A, "Additional Information Required for NRC Staff Generic Report on Boiling Water Reactors" - August 1979, Revision No. 1, December 1980 and NEDO-30936P-A, "BWR Owners Group Technical Specification Improvement Methodology (with Demonstration for BWR ECCS Activation Instrumentation - Part 1)," December 1988. NEDO-24708A states that for postulated recirculation suction line break, one low-pressure ECCS (and Automatic Depressurization System (ADS) to depressurize, if necessary) is sufficient to reflood the reactor vessel and provide adequate core cooling. NEDO-30936P-A was written to support revising TS to minimize unnecessary and excessively restrictive out-of-service times. It concludes, through the use of a realistic analyses, that one low-pressure ECCS injecting is sufficient to provide adequate core cooling for all break sizes up to and including the double-ended guillotine break of the recirculation suction piping. Provided the "A" loop of ESW and all equipment aligned to it remain operable, one loop of CS and two LPCI pumps are operable to provide more than adequate core cooling.

The licensee's calculations show that the Unit 2 HPCI pump can operate for 15 minutes with a HPCI barometric condenser failure occurring simultaneously with loss of HPCI pump room cooling. Therefore, HPCI system injection would occur for a short initial period of a LOCA on Unit 2. Longer term, the HPCI system may not be available due to heatup of the room, but it is not needed for long term accident mitigation.

As noted previously, Unit 1 has been shutdown since March 21, 1992 and is completely defueled. This significantly reduces the demand on the remaining ("A" loop) operable ESW loop and other common safety related equipment such that additional margin exists in the A ESW loop for heat removal from Unit 2 should an accident occur.

All ECCS will be available for short term mitigation of consequences of an accident. For long term accident response (i.e., greater than 10 minutes), sufficient ECCS and components will remain available to mitigate the consequences of an accident, even considering a single active failure.

For long term response to an accident occurring during the proposed 72-hour AOT, sufficient time exists so that plant operators could take appropriate action to realign equipment and establish cooling flow to ECCS. Operator actions beyond those assumed in the USFAR are not required for the short term response to an accident for the consequences to be maintained within those evaluated in the UFSAR. ECCS equipment has been analyzed for a variety of conditions involving loss of room cooling, and PECC has determined that several hours are available for operators to take corrective action to maintain certain ECCS equipment operable before environmental qualification temperature limits are exceeded.

Procedures exist to cope with similar conditions (the Station Blackout Procedures, the Loss of Offsite Power Procedures, etc.) and the operators have been trained on these procedures. The corrective action noted above can be completed in less than 1 hour.

Even if a single failure were to occur, adequate core cooling capability would be maintained since two RHR pumps and one loop of CS will be operable during the proposed 72-hour AOT. Based on the accident mitigating capabilities of the ECCS equipment that remains operable with the "B" loop of ESW inoperable, the consequences of accidents previously evaluated will not be increased by the increased AOT.

The staff has evaluated the proposed one-time extension in the AOT for "B" ESW loop from 6 to 72 hours. The staff concludes that the proposed TS change is acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Pennsylvania State official was notified of the proposed issuance of the amendment. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (57 FR 9450). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: R. Clark

Date: April 22, 1992

Attachment: Schematic

Emergency Service Water System

Simplified Schematic for Units 1 & 2 Operation

