



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
SUPPORTING AMENDMENT NO. 22 TO FACILITY OPERATING LICENSE NO. NPF-39

PHILADELPHIA ELECTRIC COMPANY

LIMERICK GENERATING STATION, UNIT 1

DOCKET NO. 50-352

1.0 INTRODUCTION

By letter dated February 22, 1989, Philadelphia Electric Company (the licensee) requested an amendment to Facility Operating License No. NPF-39 for the Limerick Generating Station, Unit 1. The proposed amendment would revise the Technical Specifications (TSs) related to the Standby Liquid Control System (SLCS) to ensure compliance with paragraph (c)(4) of the Anticipated Transient Without Scram Rule, 10 CFR 50.62, and to simplify and improve the TS requirements for the system. Specifically, the proposed TS change would revise the Surveillance Requirements and associated Figure related to SLCS to 1) assure compliance with the ATWS Rule, 2) incorporate the latest design specification data from General Electric Company (GE), 3) simplify and improve the specifications to make them easier to understand and determine when action might be required and 4) to correct a discrepancy between the TSs and the Final Safety Analysis report (FSAR).

2.0 DISCUSSION

The Final ATWS Rule requires that the SLCS for BWRs have an equivalent control capacity of 86 gpm of 13 weight percent sodium pentaborate solution. The Limerick design to meet this requirement provides for utilizing two of the three installed SLCS pumps operating at a flow rate of greater than or equal to 41.2 gpm with corresponding solution concentration to meet the above equivalency requirement. Operation at this minimum requirement requires a solution concentration of not less than 13.6%. Maintaining concentration less than 13.6% at the minimum flow rate would result in noncompliance with the SLCS control capacity requirements of the Rule. This design was previously reviewed and found acceptable (Letter, Richard J. Clark, NRC to Edward G. Bauer, Jr., PECO, dated November 3, 1987, Subject: Compliance With ATWS Rule 10 CFR 50.62). Surveillance Requirement (SR) 4.1.5.b.2 will specify this requirement as a function of available solution concentration and two pump flow rate as determined by SR 4.1.5.c. The subject application also revises SR 4.1.5.b.2 to specify the minimum available weight of sodium pentaborate must be at least 5389 lbs. This weight provides for the design required shutdown capability plus 25 percent excess allowance for potential leakage, imperfect mixing and allowances based on level instrumentation accuracies. The current value of 5500 lbs. is overly conservative.

To simplify and improve the presentation of the Technical Specification, Figure 3.1.5-2 will be deleted and the requirements relocated to other SRs. Also, the LCO will be revised to more explicitly describe the minimum operability requirements of at least two pumps and their corresponding flow paths.

The testing requirements of SR 4.1.5.d.1 will be revised to require that all three injection loops be tested within three operating cycles rather than each 36 months, thus allowing one loop to be tested during each refueling outage.

In addition, the proposed changes revise Figure 3.1.5-1 to provide a more conservative operating limit of sodium pentaborate temperature versus concentration. This new limit will provide for consistency with FSAR Figure 9.3-7 which properly depicts the operating limit.

3.0 EVALUATION

The proposed equivalency equation in SR 4.1.5.b.2, which is similar to that approved for Peach Bottom, Units 2 and 3 (Letter from Richard J. Clark, NRC to Edward G. Bauer, Jr., PECO dated June 2, 1987 transmitting Amendment Nos. 122 and 126 to Facility Operating License Nos. DPR-44 and DPR-56), provides a calculational method to ensure the minimum requirements of the ATWS Rule are met. This represents an additional requirement where none existed before. This will improve the reliability of the SLCS to perform its intended function. Revising the minimum available weight of sodium pentaborate from 5500 lbs. to 5389 lbs. maintains the design requirement for a 25 percent excess allowance for potential leakage and imperfect mixing plus allowances based on accuracies associated with the level instrumentation. The latest design specification from General Electric defines a new minimum weight of 4389 lbs. based on actual level instrumentation accuracies at the Limerick Generating Station. The 4620 gallon volume requirement of Figure 3.1.5-2 is also revised to 4537 gallons to correspond to this new minimum weight requirement. Since the 25 percent excess allowance will be maintained, the proposed change will not adversely affect safety.

SR 4.1.5.a.2, which currently requires the volume limits of Figure 3.1.5-2 to be met, is revised to require only the minimum volume (see above). The maximum concentration limit of 13.8 percent is retained in the revised Figure 3.1.5-1. The minimum sodium pentaborate solution concentration will be governed by the equivalency equation of SR 4.1.5.b.2 and will be a function of SLCS two pump flow rate. The "margin" and "overflow volumes" of the current Figure 3.1.5-2 are not significant solution parameters and therefore can be deleted. These values were provided for information only, and are available in the appropriate Surveillance Tests. Operation with a solution volume up to the tank overflow nozzle is acceptable from a safety perspective as long as the chemistry requirements of the solution are met. The impact on

safety of deleting Figure 3.1.5-2 was examined. The parameters important to safety have been preserved by relocating them to other SRs. The relocated parameters are checked and maintained at frequencies consistent with those currently in place; therefore the deletion of Figure 3.1.5-2 and incorporation of the proposed specifications will not adversely affect safety.

The proposed change to add minimum operability requirements to the LCO provides specifics on what these requirements are, since none are currently stated. This change is administrative, since the proposed minimum operability requirements are the same as those described in the Technical Specification bases and the design bases.

Although not required to meet system performance requirements, the SLCS design for the Limerick Generating Station includes a third SLCS pump. Technical Specifications SR 4.1.5.d.1 currently requires that one SLCS loop be tested in the reactor vessel injection mode every 18 months, and that all loops be tested within 36 months. To comply with the current loop testing requirements, two of the three loops must be tested every other refueling outage. In addition, the 36 month limit does not allow for variations in the length of an operating cycle or the intervening refueling outage, or for test scheduling flexibility within a given refueling outage (i.e., performance at the end versus the beginning of the outage). It is possible that circumstances could require testing of all three loops during a single outage or could require plant shutdown to meet the test interval requirements. The typical BWR has two SLCS pumps with the requirement that both injection loops be tested in 36 months. This results in one loop being tested during each outage. Due to the increased redundancy of the Limerick design, SR 4.1.5.d.1 is to be revised to allow one SLCS loop to be tested every 18 months such that all three loops are tested in three operating cycles.

Quarterly testing required by SR 4.1.5.c verifies operability of each SLCS pump and associated components and the flow path within the test loop. Eighteen month testing required by SR 4.1.5.d verifies the suction flow path for all three pumps, and verifies the common discharge flow path for all three loops. Thus, at the end of each eighteen month cycle, only the explosive valves and short segments of associated discharge piping may remain untested for two of three loops.

The short segments of discharge piping are not filled with the sodium pentaborate solution. This piping is only briefly exposed to the solution during suction flow path testing and is normally exposed to demineralized water used in injection tests and flushing of the system and therefore does not provide a significant possibility of becoming blocked by crystallization of sodium pentaborate. The Limerick Probabilistic Risk Assessment confirms this position by showing that the availability of the short segments of discharge piping is primarily dependent on the reliability of the explosive valves.

Reliability of the explosive valves is primarily dependent on the explosive actuators, which have a shelf life of five years. Limerick Generating Station Surveillance Test (ST) procedure ST-3-048-320-1 requires verification every eighteen months that the expiration date of all three explosive actuators will not be reached during the following operating cycle. Actuators that are approaching expiration are replaced with actuators from a successfully tested batch. Thus, the viability of all three explosive actuators is verified during each eighteen month testing interval.

In consideration of the above discussion, by revising the test frequency of SR 4.1.5.d.1 to require all three injection loops be tested within three operating cycles, rather than 36 months, the high reliability of the SLCS system will be maintained and the Limerick specific SLCS design will be more appropriately reflected in the Technical Specifications. Therefore, incorporation of the proposed changes will not adversely affect safety.

Based on the above, the staff has determined that the proposed changes to the TSs are acceptable.

4.0 ENVIRONMENTAL CONSIDERATION

This amendment involves a change to a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes to surveillance requirements. The 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 this amendment involves no significant hazards consideration and there has been no public comment on such finding. Accordingly, this 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 nor environmental assessment need be prepared in connection with the issuance of this amendment.

5.0 CONCLUSION

The Commission made a proposed determination that the amendment involves no significant hazards consideration which was published in the Federal Register (54 FR 18952) on May 3, 1989 and consulted with the State of Pennsylvania. No public comments were received and the State of Pennsylvania did not have any comments.

The staff 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, and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and the security nor to the health and safety of the public.

Principal Contributor: Dick Clark

Dated: June 8, 1989