



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20545

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NOS. 50 AND 13 TO FACILITY OPERATING
LICENSE NOS. NPF-39 AND NPF-85
PHILADELPHIA ELECTRIC COMPANY
LIMERICK GENERATING STATION, UNITS 1 AND 2
DOCKET NOS. 50-352 AND 50-353

1.0 INTRODUCTION

By letter dated January 31, 1991, the Philadelphia Electric Company (the licensee) submitted a request for changes to the Limerick Generating Station (LGS), Units 1 and 2, Technical Specifications (TS). The requested changes would revise the Technical Specifications (TSs) to expand the testing tolerance of the 480 volt molded case circuit breakers. This proposed change requests that the testing tolerance for the 480 volt instantaneous magnetic molded case circuit breakers, as specified in TS Surveillance Requirement (SR) 4.8.4.1, be expanded from + 20% of the current trip setpoint value of the instantaneous element to -20%/+40%.

Background

Section 3.8.4 of the TSs specifies the operability requirements for the primary containment penetration conductor overcurrent protective devices. Surveillance Requirement (SR) 4.8.4.1 requires that each Primary Containment penetration conductor overcurrent protective device shown in TS Table 3.8.4.1-1, "Primary Containment Penetration Conductor Overcurrent Protective Device," shall be demonstrated operable.

The 480 volt instantaneous magnetic (IM) molded case circuit breakers function to prevent thermal degradation of Primary Containment electrical penetrations by providing overcurrent protection for Class 1E and Non-Class 1E circuits passing through the Primary Containment barrier. These devices protect electrical penetration assembly conductors and seals from overheating in the event of overcurrent conditions. The Primary Containment electrical penetrations at LGS are designed in accordance with the guidance provided in Regulatory Guide (RG) 1.63, "Electrical Penetration Assemblies in Containment Structures for Water Cooled Nuclear Power Plants," Revision 0, dated October 1973. This RG stipulates that electrical penetration assemblies should be designed to withstand, without loss of mechanical integrity, the maximum fault current versus time conditions that could occur as a result of a single random failure of circuit overload devices.

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The 480 volt IM molded case circuit breakers are the primary devices for protecting electrical penetration assemblies from overcurrent conditions. The IM circuit breaker provides short circuit protection only and is designed to instantaneously open when the current through the circuit is equivalent or greater than the current limit setpoint of the breaker. A back-up thermal-magnetic circuit breaker is connected in series with the primary IM breaker for additional penetration protection. The back-up thermal-magnetic breaker provides both thermal and instantaneous overcurrent protection and is designed to open if current through the penetration conductors is sustained for a sufficient period of time to cause the back-up breaker to trip on thermal overload, or to instantaneously trip on overcurrent if the primary IM breaker fails to function. In addition, a thermal overload heater block is located downstream of the primary and back-up circuit breakers for additional penetration thermal overload protection. These devices contain contacts which open when current passing through the device is sustained for a sufficient period of time to reach the temperature setpoint of the block.

2.0 EVALUATION

The NRC staff has given considerable attention to the functioning and performance of circuit breakers, particularly following an incident at Salem, Unit 1, in February 1983. On November 22, 1988, the staff issued Bulletin 88-10 specifically on molded-case circuit breakers followed by a supplement to the Bulletin on August 3, 1989.

In 1984, the National Electrical Manufacturers Association (NEMA) issued Standard AB2-1984 "Procedures for Field Inspection and Performance Verification of Molded Case Circuit Breakers Used In Commercial and Industrial Applications." Section 5 of this Standard covered "Instantaneous Overcurrent Trip Test." For adjustable IM molded case circuit breakers, Table 5.1 recommended an upper range tolerance of +40% above the design setpoint and -25% below the design setpoint to allow for differences between factory and field testing setup and conditions. The licensee is proposing to change the upper range tolerance to the +40% recommended in NEMA AB2-1984 but retain the -20% in the existing TSs. NEMA AB2-1984 was rescinded a year ago and its replacement, NEMA AB4 has not yet been adopted. However, the recommended test ranges in NEMA AB2-1984 are still good guidance and from discussions with industry representatives, the values in Table 5.1 will probably remain unchanged in the replacement standard.

As discussed in the licensee's submittal, they calculated and plotted a time-current curve for each penetration conductor to verify the degree of protection for each conductor and coordination with all upstream protective devices assuming the maximum deviation of +40% from the design setpoint. The results showed that there would be a small percentage reduction in the safety margin for interrupting current and tripping time. However, in all cases, the licensee determined that the breakers will trip before the thermal limit of the associated penetration conductor is reached, thereby providing the desired thermal protection for the penetration assemblies.

The protection provided by the IM circuit breakers was not used in evaluating system fire protection standards. Therefore, changing the testing tolerances for the 480 volt IM molded case circuit breakers will not increase the probability or consequences of a fire.

We have concluded that the use of the proposed expanded testing tolerance of -20%/+40% will not affect the safety-related function of the 480 volt IM molded case circuit breakers since they will still perform their design function of protecting penetration conductors from overcurrent conditions and Primary Containment electrical penetration seals from thermal degradation. Penetration conductor protection and coordination with all upstream protective devices and downstream connected motor current inrush were evaluated and found to be acceptable. We have reviewed the licensee's analysis and find the facts, methodology, calculations and conclusions to be acceptable. The proposed change to the TSs is acceptable.

Expanding the testing tolerance for the instantaneous magnetic circuit breakers as proposed by the licensee is acceptable. The wording in the TS change proposed by the licensee could have been interpreted as also applying to air circuit breakers as well as IM breakers. Limerick does not use air circuit breakers for containment penetration conductor overcurrent protection and it is unlikely they ever would, since there are no large motors (other than the two recirculation pumps) in containment. However, the staff proposed, and the licensee accepted, alternate wording for the sentence in Section 4.8.4.1.a.2 that would specifically state that the expanded test tolerance applied only to IM breakers. The change is in complete accord with the no significant hazards consideration notice, since the latter only discussed IM circuit breakers.

3.0 STATE CONSULTATION

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

4.0 ENVIRONMENTAL CONSIDERATION

The amendments change 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 amendments involve 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 amendments involve no significant hazards consideration, and there has been no public comment on such finding. Accordingly, the amendments meet 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 amendments.

5.0 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 amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: Richard J. Clark

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