



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NOS. 52 AND 16 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 August 27, 1991, the Philadelphia Electric Company (the licensee) submitted a request for changes to the Limerick Generating Station, Units 1 and 2, Technical Specifications (TS). The requested changes would add a new Section 3/4 7-8 to the TSs to add operability requirements, Limiting Conditions for Operation (LCOs) and Surveillance Requirements (SRs) for the main turbine bypass system.

2.0 DISCUSSION:

The main turbine bypass system for the Limerick Generating Station (LGS), Units 1 and 2, is a non-safety related system designed to control steam pressure when reactor steam generation exceeds main turbine requirements during plant startup, sudden load rejection, and cooldown. It allows a direct flow path for the excess steam flow from the reactor to the condenser without going through the main turbine. The bypass capacity of the system is rated for 25% of the Nuclear Steam Supply System rated flow. Sudden load reductions within the capacity of the main turbine bypass system can be accommodated without initiating a reactor scram. The main turbine bypass system consists of a nine valve steam chest connected to the main steam lines between the outboard main steam isolation valves and the turbine stop valves. Each of these nine valves is automatically operated by hydraulic cylinders. The bypass valves are normally closed and the turbine electrohydraulic control (EHC) pressure regulator controls the turbine control valves directing all steam flow to the turbine. If the speed governor or the load limiter restricts steam flow to the turbine, the regulator controls the system pressure by sequentially opening the bypass valves. When the bypass valves open, the steam flows from the bypass valve steam chest, through the connecting piping, to the pressure breakdown assemblies where a series of orifices are used to further reduce the steam pressure before the steam enters the condenser.

The main turbine bypass system receives a signal to open the bypass valves from the EHC pressure regulator whenever the actual steam pressure exceeds the preset steam pressure (lower than the set point pressure for the main steam relief valves). This occurs when the amount of steam generated by the reactor can not be entirely utilized by the main turbine. The bypass valves open sequentially, and are used during normal startup and shut down.

If there is a full load rejection, all nine valves will open to bypass a maximum of 25% of the design steam flow. The operability of the bypass system will be determined by the number of operable main turbine bypass valves being greater than or equal to that specified in the cycle specific Core Operating Limits Report (COLR).

3.0 EVALUATION

The current operating limit minimum critical power ratio (MCPR) for LGS Unit 1 and Unit 2 is based on the feedwater controller failure (FCF) without bypass transient. By periodically verifying the operability of the bypass system, the plant can take credit for the analysis of FCF with bypass, and thereby, operate with a lower operating MCPR limit. The latest NRC approved Boiling Water Reactor (BWR) Standard TS (NUREG-0123, Rev. 3, 1980) includes the main turbine bypass system operability requirements. As a result, most BWR plants already have the main turbine bypass system operability requirements in their TS. When the LGS, Unit 1 was licensed to operate, the MCPR limit posed no operational constraints; thus, the licensee declined to include operability requirements on the main turbine bypass system.

The main turbine bypass system limits the peak pressure in the main steam lines and maintains reactor pressure within acceptable limits during events that cause rapid pressurization. Chapter 15 of the LGS Updated Final Safety Analysis Report (UFSAR) includes an evaluation of the effects of reactor pressure increase on fuel thermal margin during possible pressurization events. These analyses specified the operating limit MCPRs for the initial core at which the safety limit MCPR would not be exceeded during the pressurization events. All subsequent operating limit MCPRs are determined by the cycle specific transient analysis for LGS Unit 1 and Unit 2, respectively. For example, Unit 2 shutdown March 22, 1991 for the first refueling, returning to service on March 5, 1991. During the refueling, fuel of a different design than was previously used in Units 1 and 2 was installed in the core. The replacement fuel assemblies consisted of 212 bundles of GE9B assemblies and 12 lead test assemblies (4 bundles of GE11, 4 bundles of ANF and 4 bundles of ABB fuel). The operating limit MCPR (not taking credit for the bypass valves) is 1.30 for the GE9B and GE9B fuel, 1.35 for the GE11 fuel and 1.47 for ABB and ANF fuel. By being able to take credit for an operable steam bypass system, the initial operating limit MCPR for the GE11 fuel is reduced from 1.35 to 1.27 and the limit for the ABB and ANF fuel is reduced from 1.47 to 1.39.

Of the pressurization events, the FCF maximum demand is currently the most limiting. The cycle specific transient analysis indicates that the operating limit MCPR is lower for the FCF with an operable bypass system. Verifying the operability of the turbine bypass system in accordance with the proposed TS provides assurance that the system will operate and perform its intended function of ensuring that the safety limit MCPR is not exceeded should a FCF transient occur while operating at the reduced operating limit MCPR. Additionally, the proposed TS will ensure that when the bypass system is inoperable, the operating limit MCPR is established to provide sufficient margin such that the safety limit MCPR is not exceeded in the event of a FCF transient.

As noted previously, most BWRs already take credit for having an operable bypass system and have TSs to verify operability of the system. The proposed TSs for LGS require that if the main turbine bypass system is inoperable, the MCPR limits must be adjusted within one hour to the limits that do not take credit for the reduced peak pressures during a transient in which the bypass valves open as designed.

The proposed TS changes will ensure that the operating limit MCPR, as determined by the cycle specific transient analysis for LGS Unit 1 and Unit 2, respectively, will be established based on the operability of the main turbine bypass system such that the safety limit MCPR will not be exceeded in the event of the occurrence of the analyzed transients. Therefore, the proposed TS changes are acceptable.

4.0 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.

5.0 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 (56 FR 47241). 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.

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 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

Date: October 24, 1991