



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NOS. 100 AND 64 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 31, 1994, as supplemented by letters dated May 11, and July 3, 1995, the Philadelphia Electric Company (the licensee) submitted a request for changes to the Limerick Generating Station (LGS), Units 1 and 2, Technical Specifications (TSs). The requested changes would relocate the requirements of TS 3/4.3.8, "Turbine Overspeed Protection System" to the Updated Final Safety Analysis Report (UFSAR) and controlled plant procedures. The supplemental letters do not change the initial no significant hazards consideration determination nor the initial Federal Register notice.

Section 182a of the Atomic Energy Act (the "Act") requires applicants for nuclear power plant operating licenses to state TSs to be included as part of the license. The Commission's regulatory requirements related to the content of TSs are set forth in 10 CFR 50.36. That regulation requires that the TSs include items in five specific categories, including (1) safety limits, limiting safety system settings and limiting control settings; (2) limiting conditions for operation; (3) surveillance requirements; (4) design features; and (5) administrative controls. However, the regulation does not specify the particular requirements to be included in a plant's TSs.

The Commission has provided guidance for the contents of the TSs in its "Final Policy Statement on Technical Specifications Improvements for Nuclear Power Reactors" ("Final Policy Statement"), 58 FR 39132 (July 22, 1993), in which the Commission indicated that compliance with the Final Policy Statement satisfies Section 182a of the Act. In particular, the Commission indicated that certain items could be relocated from the TSs to licensee-controlled documents, consistent with the standard enunciated in *Portland General Electric Co.* (Trojan Nuclear Plant), ALAB-531, 9 NRC 263, 273 (1979). In that case, the Atomic Safety and Licensing Appeal Board indicated that "technical specifications are to be reserved for those matters as to which the imposition of rigid conditions or limitations upon reactor operation is deemed necessary to obviate the possibility of an abnormal situation or event giving rise to an immediate threat to the public health and safety."

Consistent with this approach, the Final Policy Statement identified four criteria to be used in determining whether a particular matter is required to be included in the TSs, as follows: (1) Installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary; (2) a process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier; (3) a structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier; (4) a structure, system, or component which operating experience or probabilistic safety assessment has shown to be significant to public health and safety.¹ As a result, existing TSs requirements which fall within or satisfy any of the criteria in the Final Policy Statement must be retained in the TSs, while those TSs requirements which do not fall within or satisfy these criteria may be relocated to other licensee-controlled documents.

2.0 EVALUATION

The turbine generator is an 1800-rpm unit manufactured by GE and is a tandem compound type with one double-flow high pressure turbine and three double-flow low pressure turbines coupled directly to an 1138-MWe generator. The low pressure turbines exhaust to a multi-pressure condenser at 2.81, 3.56, and 4.67 inches of mercury, absolute.

The turbine generator is equipped with an electrohydraulic controls system that performs two basic functions, turbine speed control for a variety of operating load conditions and turbine overspeed protection. The design functions of the turbine speed control system are to control turbine speed throughout the normal range of load conditions and ensure that a full load turbine trip will not cause the turbine to overspeed beyond acceptable limits, and to provide turbine overspeed protection to minimize the probability of generation of turbine missiles, in accordance with the requirements of General Design Criterion (GDC 4). The turbine control system is, therefore, important to the overall safe operation of the plant.

¹ The Commission recently adopted a change to 10 CFR 50.36, pursuant to which the rule was amended to codify and incorporate these criteria. (See Final Rule, "Technical Specifications," 60 FR 36953 (July 19, 1995)). The Commission specified that Reactor Core Isolation Cooling, Isolation Condenser, Residual Heat Removal, Standby Liquid Control, and Recirculation Pump Trip are to be included in the TS under Criterion 4, although it recognized that other structures, systems and components could also meet this criterion (60 FR 36956).

The turbine overspeed protection system is comprised of two overspeed control systems; the mechanical overspeed trip system and the electrical overspeed trip system. The mechanical overspeed trip system consists of a steel ring mounted on the turbine shaft and held concentric with the turbine shaft by a spring. At a predetermined speed (111% of rated speed), centrifugal force acting on the ring exceeds the spring force, moves the ring to an eccentric position, and strikes a trip lever. This causes the loss of hydraulic pressure to all the turbine valves, thus closing them. The electrical overspeed trip system is a backup to the mechanical overspeed trip. The electrical overspeed trip consists of an independent (separate from the load/speed control unit) magnetic speed pickup, a power amplifier, and a speed trip relay. At a predetermined speed (112% of rated speed), the speed trip relay is actuated and energizes a master trip relay that de-energizes two master trip solenoid valves, causing loss of hydraulic pressure to all turbine valves, thus closing them. Following a trip, all turbine valves remain closed until the trips are reset and operator action is taken to reopen the turbine valves.

The LGS TS Section 3/4.3.8, "Turbine Overspeed Protection System" protects the turbine generator against overspeed due to the failure of the speed control system. The turbine generator is not a safety-related system. The licensee stated that the Turbine Overspeed Protection System is not used for, nor capable of, detecting an abnormal degradation of a reactor coolant pressure boundary, monitoring a process variable which may initiate a design based accident (DBA), or being a part to the success path which is capable of functioning or actuating to mitigate a DBA.

The licensee proposes to relocate the TSs Section 3/4.3.8, "Turbine Overspeed Protection System" to the Updated Final Safety Analysis Report (UFSAR) and other plant procedures. These controlled documents are subject to the change control process in the LGS TSs Section 6.0, "Administrative Controls" including the provisions of 10 CFR 50.59. The licensee stated that the method of performing surveillance requirements will be adequately described in plant procedures, and that the proposed changes would enable future administrative control of changes of these requirements without processing a TSs amendment. Surveillance testing in accordance with the manufacturer's recommendations will permit LGS to optimize testing and inspection frequencies such that unnecessary testing and inspection will be reduced. Reduction of unnecessary testing and inspections will assist in reducing plant transients and may thereby enhance safety.

To date, approximately 900 valve stroking surveillance tests have been conducted in accordance with TSs Section 3/4.3.8. No valve failures have been experienced during operational testing that would have prevented valve closure required for overspeed protection. There have been no operational overspeed events to date on either unit.

The staff also notes that the proposed changes are consistent with the criteria delineated in NUREG-1433, "Standard Technical Specifications, General Electric Plants BWR/4," dated September 28, 1992, in that the operability of Turbine Overspeed Protection System is not included as part of the TSs.

The turbine is equipped with four turbine stop valves and four turbine control valves located upstream of the high pressure turbine steam inlet, and six combined intermediate valves (CIVs) located between the moisture separators and the steam inlets to the three low pressure turbines. The CIVs consist of an intermediate stop valve and an intercept valve in a single casing, each with separate operating mechanisms and controls. The turbine stop valves and the intermediate stop valves are in the full open position during normal operation. The control valves are designed to throttle steam flow to the turbine generator. The intercept valves modulate, as required, to control turbine speed following a load rejection. All of the above valves are capable of closing in 0.2 seconds on a trip signal. In accordance with manufacturer's recommendations, LGS performs actual overspeed testing of the turbine to verify the operation of the mechanical and electrical overspeed devices. Main turbine rotor and valve inspections are conducted in accordance with the "Main Turbine Maintenance Plan."

The Low Pressure Turbine rotors at LGS are the original keyway/shrunk-on disk type rotors. The turbine rotor inspection criteria outlined in the Main Turbine Maintenance Plan ensures that the probability of occurrence of a turbine generated missile is low. Following scheduled inspections of the low pressure rotors, the findings are evaluated by the manufacturer, General Electric Company, using a probabilistic method developed at the request of the NRC and used to support the Main Turbine Maintenance Plan. Following these evaluations, General Electric's recommendations are implemented, as required, to maintain the turbine missile generation probability within LGS Licensing requirements.

Although the design basis accidents and transients include a variety of system failures and conditions which might result from turbine missiles striking various plant systems and equipment, given the low likelihood of turbine missiles, the potential for this occurrence does not constitute a part of the primary success path to prevent or mitigate such design basis accidents and transients. The system failures and plant conditions could be caused by other events as well as turbine failures. Similarly, the turbine overspeed control is not part of an initial condition of a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

Probabilistic safety assessments (PRA) and operating experience have demonstrated that proper maintenance of the turbine overspeed control valves is important to minimize the potential for overspeed events and turbine damage; however that experience has also demonstrated that there is low likelihood of significant risk to public health and safety because of turbine overspeed events. Further, the potential for and consequences of turbine overspeed events are diminished by the inservice inspection program which must comply with 10 CFR 50.55(a), and a surveillance program for the turbine control and stop valves derived from the manufacturer's recommendations.

Accordingly, the staff concluded that the requirements for turbine overspeed controls do not meet the TSs criteria in the Final Policy Statement. The limiting conditions for operation and surveillance requirements for turbine overspeed controls were removed from the standard technical specifications.

On this basis, the staff concludes that these requirements are not required to be in the TSs under 10 CFR 50.36 or Section 182a of the Atomic Energy Act, and are not required to obviate the possibility of an abnormal situation or event giving rise to an immediate threat to the public health and safety. Further, they do not fall within any of the four criteria set forth in the Commission's Final Policy Statement, discussed above. In addition, the NRC staff finds that sufficient regulatory controls exist under 10 CFR 50.59. Accordingly, the staff has concluded the relocation of TS 3/4.3.8, "Turbine Overspeed Protection System" requirements to the Updated Final Safety Analysis Report (UFSAR) and controlled plant procedures is acceptable.

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 (59 FR 55884). 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.

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