



UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO DEFERRAL OF TURBINE ROTOR INSPECTIONS REQUEST

PHILADELPHIA ELECTRIC COMPANY

LIMERICK GENERATING STATION, UNIT 1

DOCKET NO. 50-352

1.0 INTRODUCTION

Section 10.2.3.6 of the Limerick Generating Station (LGS), Unit 1, Updated Final Safety Analysis Report (UFSAR) requires that the LGS turbine maintenance program be based upon the turbine manufacturer's recommendation and calculations of missile generation probabilities. In its letter dated September 11, 1995, PECO Energy Company, hereafter referred to as the licensee, requested that the scheduled inspection of the disc keyways on two of the three low pressure stages of the LGS Unit 1 main pressure turbine rotors be deferred from the sixth to the seventh refueling outage. In support of this request, the licensee has requested that the turbine manufacturer, General Electric Company (GE), perform a probability analysis in order to determine whether extending the rotor inspections can be supported. GE's analysis indicated that the probability of turbine missile generation for an operating period of 7 years from the last turbine rotor inspections is less than 7×10^{-6} .

2.0 EVALUATION

To ensure reasonable safe turbine operation, the turbine maintenance program at LGS should follow the manufacturer's recommendations and the scheduled inspection intervals should be based on NRC-approved methodology. The turbine inspection intervals should be calculated such that the corresponding turbine missile probability must be maintained less than 1×10^{-5} per year for an unfavorably oriented turbine, and 1×10^{-4} per year for a favorably oriented turbine. A turbine is favorably oriented when the turbine shaft is located radially from the axis of the reactor building. The LGS turbine shaft is located in a vertical plane that is parallel to the reactor building, and therefore, is unfavorably oriented. By a letter dated November 3, 1987, to PECO Energy, the NRC staff concluded that, based upon GE's methodology used to develop the turbine maintenance program at LGS, the missile generation probability of each low pressure turbine is less than 1×10^{-5} per year when each turbine is inspected every 6 operating years.

In a letter to the NRC dated September 11, 1995 the licensee stated that it is planning to defer the scheduled turbine rotor inspections from the sixth refueling outage to the seventh refueling outage. These inspections involved two of the three low stage disc keyways of the LGS Unit 1 main turbine. The disc keyways were scheduled to undergo visual examination during the sixth outage. The sixth refueling outage is scheduled to begin in January of 1996.

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The licensee is deferring the examination of the disc keyways because all of the Unit 1 main turbine low stage turbine rotors are scheduled to be replaced during the seventh refueling outage.

In order to support deferring the examination of the disc keyways on the Limerick's turbine rotors, GE recalculated the turbine missile probabilities using the most recent inspection data for each rotor, current prewarming conditions, and power operating conditions for the proposed operating period of 7 years. The result of the re-evaluation indicated that the probability of Unit 1 generating a turbine missile within this operating period is less than 7×10^{-6} per year. This value is less than the NRC staff's goal of 1×10^{-5} per year and is therefore acceptable. GE's evaluation also indicated that certain turbine valves and protection features must be tested at specified frequencies to maintain the validity of the analysis. The licensee has committed to test these components in accordance with the turbine manufacturer's recommendations.

3.0 CONCLUSION

The staff evaluated the information and reasons provided by the licensee in support of its request for the deferral of turbine inspections for LGS, Unit 1. Based on the results of the turbine manufacturer's probability calculations, which show that the turbine missile generation probability will be maintained less than the 1×10^{-5} per year, the staff concludes that operating the main turbine at LGS, Unit 1, until the seventh refueling outage without performing a disc keyways inspection on the turbine, will not adversely impact the plant operational safety beyond what was considered for its licensing basis, and therefore, determined to be acceptable.

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