



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 71 TO FACILITY OPERATING LICENSE NO. NPF-43

DETROIT EDISON COMPANY

FERMI-2

DOCKET NO. 50-341

1.0 INTRODUCTION

By letter dated August 17, 1990, the Detroit Edison Company (DECo or the licensee) requested amendment to the Technical Specifications (TS) appended to Facility Operating License No. NPF-43 for Fermi-2. The proposed amendment would revise the TS by eliminating the requirements for the Turbine Overspeed Protection System and relocating the requirements for system testing and maintenance to the plant preventive maintenance and performance testing program.

2.0 EVALUATION

The turbine generator is protected from excessive overspeed by two types of emergency overspeed trip protection systems, the mechanical overspeed trip systems and the electrical overspeed trip system. The overspeed protection systems are designed to prevent damage to the turbine by terminating an overspeed transient. Operation of the overspeed protection system is designed to minimize the potential for a turbine missile.

Loss of electrical load or malfunction of the control system can cause the turbine to overspeed. The mechanical and electrical emergency overspeed protection systems operate to limit the maximum turbine speed under fault conditions. The mechanical overspeed trip function consists of two redundant systems using two separate spring-loaded eccentric rings mounted on the turbine shaft. When the turbine is accelerated to 110 to 111 percent overspeed, each ring strikes its respective trip level which in turn moves a limit switch. Operation of either limit switch will energize a system of protective relays that will trip the turbine.

The electrical overspeed system uses four separate and redundant channels of speed measurement. The four channels are fed through a network of comparative logic gates. This comparative logic system monitors the speed input signals and alerts the operator with an alarm if any one of the four inputs fails to match the others. Each channel energizes an overspeed trip relay (at 110% rated turbine speed) which has its output contacts arranged in two special two-out-of-four logic arrangements so that the operation of any two channels will trip the turbine. The two logic arrangements are arranged so that all six combinations of two channels are provided, although two combinations are duplicated. An output from either logic combination will trip the turbine. This design gives a high level of reliability with the minimum number of contacts. Spurious trips

are avoided by this arrangement since each logic requires two channels to fail to the trip state before a turbine trip is initiated. Three channels must fail to their non-trip state before the system becomes completely inoperative. The system's AC power supply is redundant with automatic throwover to a backup AC supply.

Both types of overspeed protection systems trip the turbine by closing all high pressure and low pressure steam supply valves. Each high and low pressure steam line to the turbine has two valves in series such that a failure of one in each steam line would not necessarily cause a turbine to overspeed. Therefore, because of the redundancy and diversity of two types of emergency overspeed protection systems, the possibility of an overspeed condition occurring which could potentially generate a turbine missile is extremely remote.

The basis of the Standard Technical Specification 3/4.3.8 "Turbine Overspeed Protection System" involves maintaining the turbine overspeed protection system to reduce the hazards of turbine missiles. This function is discussed in Standard Review Plan Sections 3.5.1.3 and 10.2.3. Prior to issuance of the Fermi-2 Operating License, the licensee performed analyses of potential damage which would result from a turbine missile which could occur if the overspeed protection system failed to terminate an overspeed transient. Based on the orientation and location of the Fermi-2 turbine and the structural design of the plant, the licensee concluded that any potentially generated turbine missile will not prevent the reactor from achieving and maintaining a safe shutdown condition.

The NRC staff reviewed and accepted this analyses in the Fermi-2 Safety Evaluation Report (SER), NUREG-0798. Accordingly, the Bases for Fermi-2 TS 3/4.3-8 states in part: "...Protection from turbine excessive overspeed is not required to protect safety-related components, equipment, or structures. However, it is included in order to improve overall plant reliability." The licensee has confirmed that the associated analyses have been reviewed and updated and that the previous conclusions remain unchanged with a same or greater factor of conservatism. TS 3/4.3.8 requires that a weekly surveillance requirement be performed by cycling all turbine high pressure stop and control valves and all turbine low pressure stop and intercept valves. In order to perform this surveillance requirement, reactor power must be reduced to compensate for the reduction in steam flow to turbine. This weekly reduction in reactor power is not desirable because the associated transient operation (frequent power increase and decreases) of the plant makes it more susceptible to an operational event.

The elimination of the TS requirements for overspeed protection will allow the licensee to perform testing and inspection of the system at frequencies based upon manufacturer's recommendations and operational experience or constraints.

This will allow an appropriate decrease in the weekly testing frequency which will reduce the challenges to plant equipment and personnel and by so doing, the potential of a plant transient is reduced and safety is enhanced.

Recent inspection of some of the turbine's steam supply valves indicate that they are in good condition. During the first refueling outage, two high pressure turbine steam supply valves were inspected. No problems were identified on

these valves. Additionally, the bearings and glands from two low pressure turbine valves were dismantled for inspection and found to be in good condition. The TS required testing of the mechanical and electrical overspeed protection instrumentation indicated that if a turbine overspeed condition had existed the turbine would have been tripped. At all times at least one mechanical system and enough channels of the electrical system were available to trip the turbine.

In summary the elimination of TS 2/4.3.8 is based upon:

- (1) The turbine is protected from excessive overspeed by two types of emergency systems in addition to its normal speed control system.
- (2) Based on the orientation and location of Fermi-2 turbine and the structural design of the plant, any potentially generated turbine missile will not prevent the reactor from achieving and maintaining a safe shutdown condition.
- (3) Testing and inspection frequencies can be optimized within the plant program; taking into consideration manufacturer's recommendations, operational experience, and constraints. Power reductions to test turbine valves which are currently required at a weekly frequency, will be allowed to be performed at a reduced frequency. This enhances safety by reducing the probability of plant transients.
- (4) Recent inspection of a sample of the turbine steam supply valves and the operational test history of the overspeed protection instrumentation indicate that this system has always remained operable.

Based on the above evaluation the staff finds the proposed changes to the TS is acceptable.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Michigan State official was notified of the proposed issuance of the amendment. The State official had no comment.

4.0 ENVIRONMENTAL CONSIDERATION

The amendment changes 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 in 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 which 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 amendment involves no significant hazards consideration and there has been no public comment on such finding. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR Section 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 amendment.

5.0 CONCLUSION

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, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

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