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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO.177 TO FACILITY OPERATING LICENSE NO. DPR-64

POWER AUTHORITY OF THE STATE OF NEW YORK

INDIAN POINT NUCLEAR GENERATING UNIT NO. 3

DOCKET NO. 50-286

1.0 INTRODUCTION

By letter dated September 8, 1997, as supplemented November 3, 1997, the Power Authority of the State of New York (PASNY or the licensee) requested changes to the Indian Point 3 (IP3) Technical Specifications (TSs) to revise the f(ΔI) function. The f(ΔI) function is defined in the TS as a function of the indicated difference between the top and bottom detectors of the power range nuclear ion chambers. This function is used in the calculation of the Overtemperature ΔT (OTΔT) reactor trip. The licensee's November 3, 1997, submittal contained clarifying information that did not change the staff's proposed finding of no significant hazards considerations.

2.0 EVALUATION

The f(ΔI) function is used in the OTΔT trip equation given in TS 2.3 for IP3 in the following manner:

$$\Delta T \leq \Delta T_0 [K_1 - K_2 (T_{avg} - T') + K_3 (P - P') - f(\Delta I)]$$

where

ΔT is the measured reactor coolant system (RCS) ΔT

ΔT_0 is the indicated ΔT at rated thermal power (RTP)

T_{avg} is the measured RCS average temperature

T' is the nominal T_{avg} at RTP

P is the indicated pressurizer pressure

P' is the pressurizer pressure at RTP

K_1, K_2, K_3 are constants

ΔI is equal to $q_t - q_b$, where q_t and q_b are the percent power in the top and bottom halves of the core, respectively, and $q_t + q_b$ is total core power in percent of RTP.

The OTΔT trip is designed to provide departure from nucleate boiling (DNB) protection for relatively slow transients such as the uncontrolled rod withdrawal at power, inadvertent boron dilution, excessive load increase, and depressurization of the reactor coolant system. By the equation, an increase in T_{avg} will cause the setpoint to decrease, a decrease in pressure will cause the setpoint to decrease, and a worsening axial flux distribution will cause a setpoint decrease. Each of these parameter changes causes a decrease in the DNB ratio (DNBR) and, therefore, requires a more conservative trip setpoint. At IP3, this trip function also provides a signal to generate a turbine runback prior to reaching the trip setpoint.

The current f(ΔI) function is defined such that when the percent power difference between the top and bottom halves of the core is between -6.75% and +6.9%, f(ΔI) is zero. If the percent power difference between the top and bottom halves of the core differ by more than this allowable span, a penalty on the ΔT trip setpoint is imposed. For each percent that the magnitude of $q_t - q_b$ exceeds +6.9%, the trip setpoint is automatically reduced by an equivalent of 3.333% of RTP. For each percent that the magnitude of $q_t - q_b$ is more negative than -6.75%, the trip setpoint is automatically reduced by an equivalent of 4.0% of RTP. PASNY has proposed to increase the allowable span for a zero f(ΔI) penalty to -15.75% through +6.9%, based on the reanalysis of the boron dilution event discussed below. The penalties imposed for a percent power difference between the top and bottom of the core which are larger than this span would remain unchanged.

Although the boron dilution event is analyzed for various operational modes, only the Mode 1 analysis relies on the OTΔT trip function. The most limiting dilution event occurs with the control rods in automatic. When the transient is initiated, the rod controller attempts to compensate for the power and temperature increase by slow insertion of the control rods. Rod motion is terminated when the rods reach the insertion limits, which results in a rod insertion limit low level alarm to the operator. Since IP3 procedures require the placement of one primary water makeup pump (PW pump) control switch in the pull-out position, the event was reanalyzed assuming a dilution rate corresponding to the maximum flow of only one PW pump (plus pump uncertainties). The lower dilution flow rate decreases the reactivity inserted into the core after the rods have reached the insertion limits, thereby reducing the increase in core power and yielding lower axial peaking. This allows the operator to terminate the transient within 15 minutes after the insertion limit alarm and before the f(ΔI) trip penalty is required, thereby allowing f(ΔI) to be expanded to a more negative limit.

The revision to the negative f(ΔI) penalty does not affect the normal plant operating parameters, the safeguards systems actuations or accident mitigation capabilities, or the assumptions used in loss-of-coolant-accident (LOCA) and non-LOCA events, nor does it adversely affect the results of these analyses. It will provide additional margin to prevent a plant trip during a load rejection transient.

Therefore, the staff concludes that the implementation of the revision to the negative f(ΔI) penalty beginning in Cycle 10 will not adversely affect the subsequent safe operation of IP3 and the proposed change is acceptable.

The staff has reviewed the licensee's request to increase the allowable span for a zero f(ΔI) penalty in the OTΔT trip function to -15.75% through +6.9%. Based on the staff's evaluation, the proposed change will not adversely affect the subsequent safe operation of IP3 beginning in Cycle 10 and is, therefore, acceptable.

3.0 STATE CONSULTATION

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

4.0 ENVIRONMENTAL CONSIDERATION

The amendment changes 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 amendment involves 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 amendment involves no significant hazards consideration, and there has been no public comment on such finding (62 FR 54876). Accordingly, the amendment meets 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 amendment.

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

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Date: January 26, 1998