



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
SUPPORTING AMENDMENT NO. 21 TO FACILITY OPERATING LICENSE NO. DPR-66

DUQUESNE LIGHT COMPANY

OHIO EDISON COMPANY

PENNSYLVANIA POWER COMPANY

BEAVER VALLEY POWER STATION, UNIT NO. 1

DOCKET NO. 50-334

Introduction

By letter dated June 26, 1979, Duquesne Light Company (the licensee) submitted a proposed amendment to Facility Operating License No. DPR-66 for the Beaver Valley Power Station, Unit No. 1. This proposed amendment would reduce the time constant of the neutron flux rate reactor trips from two seconds to one second, and the trip setpoint of the high negative rate from five percent to three percent.

Discussion

A single rod drop in the PWR is a departure from nucleate boiling (DNB) limited transient considered to be a Condition II event, that is, a moderate frequency transient. In a telephone call on March 28, 1979 and in a meeting on April 12, 1979, Westinghouse informed the NRC staff that there is a deficiency in the analysis of the single rod drop transient. In three-loop Westinghouse power plants, the reactor control system obtains its reactor power signal from a dedicated excor detector. Recent spatial analyses by Westinghouse indicated that for a dropped rod in the core quadrant adjacent to the dedicated detector, the power overshoot, when the reactor is in the automatic mode, is greater than the value calculated by the methods used in the Final Safety Analysis Report (FSAR). This could lead to exceeding the DNB limit. No credit is taken in the analysis for the negative flux rate trip. Westinghouse proposed adjustment of the negative flux rate trip constants for all its reactors without turbine runback feature. The adjustment would result in a reactor trip on any single rod, which would of course then preclude a DNB problem.

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Evaluation

At Beaver Valley Power Station, Unit No. 1, the high positive and negative flux rate trip circuits use auctioneered (high) excore detector signal. The auctioneered detector signal goes into a rate-lag processing circuit whose output is sent to the high positive and negative flux rate trip bistables. In order to ensure that the drop of any rod will cause a reactor trip regardless of rod worth or location, Duquesne Power and Light Company has proposed lowering the Technical Specification rate-lag circuit time constant from two seconds to one second, and lowering the negative flux rate trip value from -5% to -3%. The limiting safety system (LSS) setpoint is ≥ 1 second for the time constant, and is $\geq -3.5\%$ for the negative flux rate trip value. These new LSS setpoints would result in reactor trips for negative flux rates 1% to 2% per second slower than would have occurred with the original setpoints. The new setpoints are designed to ensure that a reactor trip will occur for any dropped rod. Therefore, the potential for the automatic control system causing power overshoots as a result of a dropped rod would be eliminated.

The rate-lag circuit output is a direct function of the time constant and is used in the high positive flux rate trip circuit (whose trip setpoint is not being changed).— The net result in lowering the time constant from two seconds to one second is that some positive flux ramps which previously would have caused reactor trips now will not. However, the flux ramps (permitted by the new setpoints) are relatively low rates and are generally in the range of those produced by the automatic control system (i.e., not rod ejections). The FSAR states that protection for rod ejection accidents is provided by the high flux (high and low setpoints) signal, and the high positive rate trip function is a "complementary" trip. Changing the rate-lag circuit time constant will not alter the role of the high positive flux rate trip in affording reactor protection during rod ejection accidents.

Since the new setpoints will ensure that all rod drops will result in reactor trips, which will eliminate the possibility of automatic control system induced power overshoots, and since the positive flux rate trip is still available as a complementary trip for rod ejection accidents, the proposed setpoints are acceptable. We will continue to maintain cognizance of reactor operating data to ensure that all actual cases of dropped control rods indeed result in reactor trips in the power plants with negative flux rate trips. Should any cases occur where this is not the case, we would require further readjustment of the trip setpoints, or other corrective action.

Environmental Consideration

We have determined that the amendment does not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we have further concluded that the amendment involves an action which is insignificant from the standpoint of environmental impact and, pursuant to 10 CFR §51.5(d)(4), that an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of this amendment.

Conclusion

We have concluded, based on the considerations discussed above, that: (1) because the amendment does not involve a significant increase in the probability or consequences of accidents previously considered and does not involve a significant decrease in a safety margin, the amendment does not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Date: November 3, 1979

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