



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO.101 TO FACILITY OPERATING LICENSE NPF-9
AND AMENDMENT NO. 83 TO FACILITY OPERATING LICENSE NPF-17

DUKE POWER COMPANY

MCGUIRE NUCLEAR STATION, UNITS 1 AND 2

DOCKET NOS. 50-369 AND 50-370

1.0 INTRODUCTION AND BACKGROUND

By letter dated August 3, 1989, as supplemented by letter dated November 9, 1989, Duke Power Company (the licensee) proposed a change to the McGuire Nuclear Station, Unit 1, Technical Specifications (TS), pertaining only to the remainder of Cycle 6 scheduled to be completed about March 1990. The proposed change would relax the required number of available incore detector thimbles from 75 percent to 50 percent of the total number (i.e., from 44 to 29 thimbles based on the total 58). Although the change is applicable to Unit 1 only, Unit 2 is included administratively because the TS are combined in one document for both units.

During the last refueling, the detector thimbles were cleaned and eddy current examined. Upon restart, the detectors had sticking problems that prevented some of them from traveling the entire length of the incore thimble tubes. The mechanical problems subsided in time and for the January 17, 1989, flux map, 55 thimbles were used. After an unrelated steam generator tube rupture outage and subsequent return to power, the plant has again experienced detector sticking problems. During the flux map taken on July 14, 1989, only 43 thimble tubes could be fully accessed. On July 18, 1989, another map was taken with 44 thimbles, thus satisfying the 75 percent requirement.

The licensee suspects that a residue left from the cleaning process is causing the sticking problems. (This is the first time this particular cleaning method has been used at McGuire.) The thimbles will be cleaned again (by a different

method) at the next refueling outage or during a shutdown should one of sufficient duration occur. Failure to have at least 75 percent of the thimbles accessible would result in a forced shutdown due to the inability to meet the requirements of existing TS 3/4.2.2 and 3/4.2.3. Because of this, the licensee has requested relaxation from the 75 percent criterion. This relaxation, as evaluated below, applies only until the next Unit 1 refueling outage. The licensee has proposed increased uncertainty to be applied to the peaking factors if flux maps are taken with fewer than 75 percent of the thimbles. By letter dated November 9, 1989, the licensee committed that if an excore detector becomes inoperable while less than 75 percent of the incore detectors are available, power will be lowered to 75 percent within four hours. This change in the licensee's procedures clarifies the changes noticed in the Federal Register on August 21, 1989, and does not alter the initial determination of no significant hazards. We have approved similar changes for continued operation at lowered power for other plants.

2.0 EVALUATION

Essentially all Pressurized Water Reactor (PWR) TS contain a requirement of operability of 75 percent of the incore detector locations for periodic mapping of the core power distribution. On several occasions, for various reasons, failures in operating PWRs have approached or exceeded 25 percent, and a relaxation of the 75 percent requirement has been permitted for the remainder of the affected operating cycle.

The licensee's proposed change allows for the increase in the movable incore map measurement uncertainty in F_Q above the 5 percent normal allowance by the relationship $5\% + [3 - (T/14.5)] \times 2\%$ where T is the number of available detectors. This relationship increases the uncertainty allowance to 7 percent when only half of the thimbles are used. The uncertainty in the measurement of $F_{\Delta H}^N$ is 4 percent and is proposed to be increased to 5 percent if only half the detectors are used. These are the same allowances that were approved for similar plants. In addition to the uncertainty, a minimum of four thimbles per quadrant is required (where quadrant includes both horizontal-vertical quadrants and diagonally bounded quadrants). Duke Power Company requested Westinghouse to assess the incremental peaking factor measurement uncertainties and incore

calibration impact associated with a reduction to a minimum of 29 (i.e., 50 percent) of the 58 movable detector thimbles. The study indicates that additional uncertainties of 1.0 percent for $F_{\Delta H}^N$ and 2 percent of F_Q are appropriate when the number of instrumented assemblies is reduced from 58 to 29.

The licensee has provided the results of recent core maps which show that currently there is approximately 6.4 percent margin in total core peaking factor and 6.1 percent margin in the $F_{\Delta H}^N$ to the TS limits for steady state operating conditions. Since the unit does not load follow and both the total core peaking factor and $F_{\Delta H}^N$ normally tend to decrease with burnup, we conclude that these margins, along with the proposed increases in measurement uncertainty, are sufficient to preclude concern that the required monitoring of the limits could fail to detect a problem for the remainder of the operating cycle.

Another safety concern relating to degradation of incore mapping ability is the ability to detect anomalous conditions in the core. Most anomalous conditions produce either an axial or radial effect, which would cause either a change in quadrant tilt ratio or axial offset ratio. These are monitored by the excore detectors. Should an excore detector become inoperable while less than 75 percent of the incore detectors are available, the licensee has committed in the letter of November 9, 1989, to lowering power to 75 percent within four hours. As indicated in the letter, the licensee's procedures will be revised consistent with this commitment. Furthermore, the core exit thermocouples in the reactor provide a useful supplement to the incore detectors to detect problems.

Our review of the suitability of operation of the McGuire Unit 1 reactor with a reduced number of available movable incore thimble locations to as few as 50 percent indicates that adequate margin exists at this time in Cycle 6 and sufficiently increased uncertainty allowance has been made to insure that TS peaking factor limits will be met. This finding recognizes that excore detectors are operable, or that power will be lowered to 75 percent if an excore detector becomes inoperable while less than 75 percent of the incore detectors are available. In addition, we find that there are adequate supplemental indicators of anomalous conditions to preclude an unsafe condition from escaping detection in the absence of full incore detector mapping capability.

Consistent with the intent of these amendments, the licensee has indicated that all available incore detectors will be used if less than 75 percent are available.

Based on the above considerations, we conclude that the proposed TS changes for continued operation with less than 75 percent of the incore detectors available are acceptable for the remainder of Unit 1 Cycle 6 provided all excore detectors are operable, or provided reactor power is reduced to 75 percent if one excore detector becomes inoperable. Station procedures are being revised accordingly.

3.0 ENVIRONMENTAL CONSIDERATION

These amendments involve changes to the installation or use of facility components located within the restricted area as defined in 10 CFR Part 20. The 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 exposure. The Commission has previously published a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding. 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 these amendments.

4.0 CONCLUSION

The Commission made a proposed determination that the amendments involve no significant hazards consideration which was published in the Federal Register (54 FR 34633) on September 21, 1989. The Commission consulted with the State of North Carolina. No public comments were received, and the State of North Carolina did not have any comments.

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

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Dated: December 14, 1989