



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

SUPPLEMENT TO THE

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 46 TO FACILITY OPERATING LICENSE NO. DPR-50

METROPOLITAN EDISON COMPANY  
JERSEY CENTRAL POWER AND LIGHT COMPANY  
PENNSYLVANIA ELECTRIC COMPANY

THREE MILE ISLAND NUCLEAR STATION, UNIT NO. 1

DOCKET NO. 50-289

Introduction

On November 22, 1978, the Commission issued Amendment No. 46 to Facility Operating License No. DPR-50 for Three Mile Island Nuclear Station, Unit No. 1 (TMI-1). The amendment revised the Technical Specification for TMI-1 by increasing the frequency at which heat balance checks are performed to verify the calibration of the power range nuclear instrumentation. The Safety Evaluation for the amendment considered the change to the Technical Specification as an interim measure until our further evaluation of the increased frequency for performing heat balance checks of the TMI-1 out-of-core detectors (OCDs) was completed. Our further evaluation of this matter is now complete and is the subject of this Supplemental Safety Evaluation.

Background

Nuclear instruments which are sensitive to the rate of the nuclear fission process are used to provide an electrical signal proportional to reactor power level. This electrical signal is also used in the reactor protection system to initiate shutdown of the reactor when excessive power levels are generated. The electrical signal accurately reflects reactor power level, however, only when it is calibrated against an actual thermal measurement of reactor power (referred to as a heat balance measurement).

For steady-state operation ( $\leq 5\%$  change in Rated Thermal Power (RTP), or Rod Index Changes  $\leq 15\%$ ) the TMI-1 Technical Specifications were amended to increase the frequency of performing heat balance checks from twice a week to once per shift, and required calibration of the OCDs whenever the indicated power and the actual thermal power differs by more than 2%. However, the staff questioned whether a once per shift check was adequate to ensure that the OCDs are properly calibrated.

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## Evaluation

In order to resolve the staffs' concerns, the licensee submitted information on OCDs calibration (Reference 1) and verification on once per shift surveillance (Reference 2). Based on these submittals, the licensee intends to conduct the surveillance as follows for the various operating modes:

1. During steady-state operation as defined above, the licensee will continue to check the heat balance once a shift.
2. During power level changes of greater than 5% RPT or changes in rod index of more than 15% (except power escalation from the shutdown condition), the licensee changed its operating procedures to check the power range OCD calibration after reaching the desired power level and calibrate, if necessary, to maintain less than 2% error.
3. During escalation from the shutdown condition the current operating procedures call for calibration checks at 15-30%, 70%, 90% and 100% RTP.
4. During normal power increases, the same procedures call for calibration checks at 90% and 100% RTP.

During uncontrolled power level changes or transients, the reactor would scram from a high flux trip. In these cases, the flux increases so rapidly that a trip delay time due to the OCD error, associated with the transient power increase is negligible.

We find the licensee's surveillance for operating modes 2 thru 4 (above) acceptable since procedures require calibration checks of the OCD's after various changes in power levels.

In order to resolve our concerns regarding the once per shift calibration check during steady-state operation, we requested the licensee to select randomly one month of calibration data to determine the number of times (and the magnitude) that the nuclear instrumentation exceeded the  $\pm 2\%$  calibration limit specified in the Technical Specification. The results showed that the nuclear instrumentation was within  $\pm 2\%$  of the calculated heat balance and no recalibration of the nuclear instrumentation was necessary during this period. As part of the licensee's calibration check, he requires that the computer readout (ERROR Linear Power Computer, ELP) be within  $\pm 1\%$  calibration limit. On two occasions, the ELP exceeded the  $\pm 1\%$  calibration limit which required a correction. In one case, the  $1\%$  ELP calibration limit was exceeded by an average of 0.253% on all channels and in the second case, one channel was found to exceed the limit by 0.05%. However, at no time did the ELP, which is part of the nuclear instrumentation, exceed the  $\pm 2\%$  calibration limit. The nuclear instrumentation did not require a calibration adjustment to adhere to the  $\pm 2\%$  calibration limit for an entire month even though these instruments are checked once per 8-hour shifts.

Conclusion

Based on the above and the information submitted by the licensee (Reference 1 & 2), we conclude that the changes by Amendment No. 46 to the Technical Specifications are adequate and therefore acceptable.

References:

1. Letter, J. G. Herbein to R. W. Reid, TMI-1, Docket No. 50-289; Additional information concerning OCD calibration; dated March 14, 1979.
2. Letter, J. G. Herbein to R. W. Reid, TMI-1, Docket No. 50-289; Certified letter verifying once per shift surveillance; dated December 18, 1979.