

UNITED STATES OF AMERICA  
 NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
METROPOLITAN EDISON COMPANY,	)	
JERSEY CENTRAL POWER & LIGHT	)	
COMPANY, AND	)	DOCKET NO. 50-289
PENNSYLVANIA ELECTRIC COMPANY	)	
	)	
(Three Mile Island Nuclear Station	)	
Unit No. 1)	)	

MODIFICATION OF CONDITIONS OF EXEMPTION

I.

Metropolitan Edison Company, Jersey Central Power and Light Company, and the Pennsylvania Electric Company (the licensees), are the holders of Facility Operating License No. DPR-50 which authorizes the operation of the nuclear power reactor known as Three Mile Island Nuclear Station, Unit No. 1 (TMI-1 or the facility), at steady state power levels not in excess of 2535 megawatts thermal (rated power). The facility consists of a Babcock & Wilcox Company (B&W) designed pressurized water reactor (PWR) located at the licensees' site in Dauphin County, Pennsylvania.

II.

On April 27, 1978, the Commission granted the licensees of TMI-1 an Exemption from the requirement of 10 CFR 50.46(a) that Emergency Core Cooling System (ECCS) performance be calculated in accordance with an acceptable calculational model which conforms to the provisions in Appendix K. This Exemption added license conditions requiring limitation

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of operating power level, adherence to certain operating procedures, and submission of additional analyses of ECCS performance.

The need for this Exemption arose from the recent identification of certain errors in the ECCS performance calculations submitted by Metropolitan Edison Company (Met Ed) in accordance with the requirements of the Commission's regulations, 10 CFR §50.46. Following discovery of these errors, Met Ed, by letter dated April 27, 1978, requested such an exemption to permit operation of TMI-1 at 100% of full power (2535 Mwt). In support of their request, Met Ed submitted calculations which addressed these errors assuming specified operator actions were completed within a defined period of time following the postulated accident.

In their submittal of April 27, 1978, Met Ed also stated that they had modified certain plant procedures to provide the necessary operator actions on a time scale consistent with that assumed in the analysis, and that they had conducted a drill to verify that the assumed operator response time was achievable. Met Ed committed to submit as soon as possible a request for amendment of the TMI-1 Technical Specifications as appropriate to reflect adoption of these procedures, and committed to submit a proposal for a permanent solution to this problem by July 24, 1978.

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Based on our review of the Met Ed submittal of April 27, 1978, we found that the calculations did not clearly support the conclusion that the most limiting break size had been identified. Accordingly, we could not conclude that operation of TMI-1 at 100% of full power (2535 Mwt) would be fully in conformance with 10 CFR 50.46. On the other hand, for operation at power levels up to 91% of full power (2311 Mwt), ECCS performance calculations for a range of small breaks indicated that the limiting break would not result in core uncover, if appropriate operator action (equivalent to that assumed in the calculations) were properly taken, thus providing a very substantial margin on peak clad temperature below the limits of 10 CFR 50.46(b).

Therefore, on April 27, 1978, we granted TMI-1 an exemption from the provisions of 10 CFR 50.46 subject to the conditions that power would be limited to 91% of full power (2311 Mwt); that additional analyses, as specified by the NRC staff, would be submitted as soon as possible; and that the facility would be operated in accordance with the procedures described in the Met Ed letter of April 27, 1978.

By letter dated May 3, 1978, Met Ed verified that the modifications of plant procedures necessary to assure proper operator action in the event of a small break had been implemented on April 27, 1978. In this submittal Met Ed also described the tests that had been conducted to verify the acceptability of the procedures. Based on our review of this submittal, supplemented by discussions with Met Ed, we have concluded that the procedures applicable to small breaks implemented by Met Ed are acceptable.

The Met Ed submittal of May 3, 1978, also presented the results of analyses performed by the reactor vendor (Babcock and Wilcox) for reactor coolant pump discharge line break sizes of 0.17, 0.15, 0.13, 0.1 and 0.04 ft<sup>2</sup> at a reactor power level of 2568 MWt. This power level is representative of the full power rating of similar Babcock and Wilcox - designed reactors and encompasses the 2535 MWt full power rating of TMI-1. Based on these results, B&W states that with operator action consistent with that modeled in the analysis, a 0.13 ft<sup>2</sup> discharge line break is the most limiting case. In this case, core uncover occurs for about 350 seconds and the conservatively calculated peak clad temperature is approximately 1550°F. This temperature is well below the limit specified in 10 CFR 50.46(b).

Based on our review of these analyses, we find that the calculations support the conclusion that a .13 ft.<sup>2</sup> discharge line break is the most limiting case. However, the analyses do not demonstrate that the assumptions employed in supplying heat inputs to the FOAM portion of the calculations were conservative. We are also reviewing whether use of simplified input in the FOAM calculations satisfies the requirement for calculation using an approved model. Accordingly, we cannot conclude at this time that operation of TMI-1 at 100% of licensed power would be fully in conformance with 10 CFR 50.46. On the other hand, for operation of this facility at power levels up to 100% of full power (2535 MWt), ECCS performance calculations for the limiting small break indicate that

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this break has a very substantial margin on peak clad temperature below the limits of 10 CFR 50.46(b) if operator action consistent with that assumed in the analyses is properly taken. However, until the licensee provides additional analyses to justify that the submitted calculations are suitably conservative, the NRC staff cannot determine that operation of TMI-1 at full power under the conditions of the revised calculations applicable to this facility conforms fully to the requirements of 10 CFR 50.46. Nevertheless, because of the very substantial margin on peak clad temperature below the limits of 10 CFR 50.46(b), the NRC staff believes that operation of TMI-1 at power levels of up to 2535 MWt in accordance with appropriate operating procedures identified herein will not endanger life or property or the common defense and security, and the conditions which were a part of the Exemption of April 27, 1978, may be modified accordingly.

In the course of our review of this matter, two related issues arose: (1) the need to apply greater uncertainties to the measured values of neutron flux in each quadrant of the reactor core and (2) a discrepancy between measured and predicted power distributions which exceeded previously established acceptance criteria.

With respect to the first of these issues, B&W recently reported to Met Ed that on the basis of operational experience and a reevaluation of measurement error statistics and error propagation, greater uncertainties should be applied to the measured values of quadrant flux tilt. This greater uncertainty was necessary to assure that the actual flux tilt did not exceed the limiting value assumed in the evaluation of postulated

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accidents including a LOCA (including evaluation of ECCS performance for large break LOCAs). A description of the reevaluation and recommended reduced limits on allowable measured flux tilt were presented in a B&W report submitted to the staff on May 11, 1978. By letter dated May 10, 1978, Met Ed requested amendment of the TMI-1 Technical Specifications to reflect the more conservative limits. We have reviewed the B&W report and the Met Ed request relative to this matter and have concluded that the limits requested for TMI-1 are acceptable for full power operation. Use of these limits is authorized this date by Amendment No. 40 to the TMI-1 Operating License No. DPR-50 issued concurrently with this Modification of Conditions of Exemption.

With respect to the second issue, recent measurements of power distribution within the TMI-1 core indicated that the measured power peaking values exceeded the predicted values by more than the previously established acceptance criteria. Because Met Ed was unable to identify any errors in calculation or measurement that would account for this discrepancy, they have concluded that greater uncertainties are associated with their calculational methods than previously believed. Accordingly, Met Ed has evaluated the effect of this added uncertainty on plant operating limits and has reduced the allowable axial power imbalance and the allowable position limits for the Axial Power Shaping Rods (ASPRs) to account for the greater uncertainty. By applying an additional uncertainty of 6%, which is greater than the observed deviation above the acceptance criteria, Met Ed developed more restrictive limits on axial power imbalance and APSR position to account for the added uncertainty and, by letter of May 16, 1978,

requested amendment of the TMI-1 Technical Specifications to reflect these proposed limits. The staff has reviewed the Met Ed submittal which requested these revised limits and concluded that they are acceptable provided Met Ed compares predicted and measured power distributions after about 25 EFPD of core exposure and reports the results to the NRC. Subject to this condition, use of these limits is being authorized this date by Amendment No. 40 to the TMI-1 Operating License No. DPR-50.

Therefore, in the absence of any safety problem associated with operation of the facility during the period until revised calculations wholly in conformance with 10 CFR 50.46 are completed, there appears to be no public interest consideration favoring undue restriction of the operation of the captioned facility. Accordingly, the Commission has determined that continuation of the Exemption of April 27, 1978 with modified conditions is appropriate. The Exemption is limited to the period of time necessary to complete and review the revised calculations.

### III.

Copies of the following documents are available for inspection at the Commission's Public Document Room at 1717 H Street, Washington, D. C. 20555, and are being placed in the Commission's local public document room at the State Library of Pennsylvania, Harrisburg, Pennsylvania.

- (1) the application for exemption dated April 27, 1978,
- (2) Exemption in the matter of Metropolitan Edison Company, Jersey Central Power and Light Company, and Pennsylvania Electric

Company, Three Mile Island Nuclear Station, Unit No. 1, dated April 27, 1978,

- (3) supplementary information contained in letter from J. G. Herbein (Met Ed) to R. W. Reid (NRC), dated May 3, 1978, and
- (4) this Modification of Conditions of Exemption in the matter of Metropolitan Edison Company, Jersey Central Power and Light Company, and Pennsylvania Electric Company, Three Mile Island Nuclear Station, Unit No. 1.
- (5) Amendment No. 40, of this date, to Facility Operating License No. DPR-50, for Three Mile Island Nuclear Station, Unit No. 1, Docket No. 50-289.

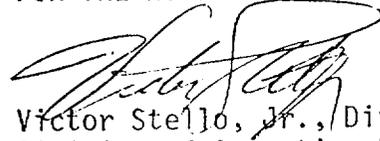
IV.

WHEREFORE, in accordance with the Commission's regulations as set forth in 10 CFR Part 50, the conditions of the exemption from the requirements of 10 CFR 50.46(a) granted the licensees on April 27, 1978, are modified so that effective this date the exemption is conditioned as follows:

- (1) As soon as possible, Metropolitan Edison Company shall submit a reevaluation wholly in conformance with 10 CFR 50.46 of ECCS cooling performance calculated in accordance with the B&M Evaluation Model for operation with operating procedures described in its letters of April 27, 1978, and May 3, 1978.
- (2) The power level shall not exceed 2535 MWt, and

(3) Until further authorization by the Commission, Metropolitan Edison Company shall operate in accordance with the procedures described in its letter of April 27, 1978, supplemented by letter dated May 3, 1978.

FOR THE NUCLEAR REGULATORY COMMISSION



Victor Stello, Jr., Director  
Division of Operating Reactors  
Office of Nuclear Reactor Regulation

Dated at Bethesda, Maryland  
this 19th day of May 1978.