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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

COMMISSIONERS:

Nunzio J. Palladino, Chairman
Thomas M. Roberts
James K. Asselstine
Frederick M. Bernthal
Lando W. Zech, Jr.

SERVED DEC 21 1984

In the Matter of METROPOLITAN EDISON COMPANY (Three Mile Island Nuclear Station, Unit No. 1)	Docket No. 50-289 SP (Restart)

ORDER

On December 12, 1983 the Union of Concerned Scientists (UCS) submitted a filing entitled "Response to GPU Letter of December 6, 1983, Regarding Emergency Feedwater Flow Instrumentation." In that filing UCS challenged the adequacy of the accuracy of emergency feedwater (EFW) flow instrumentation at Three Mile Island, Unit 1 (TMI-1). UCS, arguing that the instrumentation is required to have an accuracy of $\pm$ 10%, requested that the Commission prevent TMI-1 from operating until the instrumentation is shown to have that degree of accuracy. The Commission has decided to deny the UCS request for the reasons set forth below.

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Background

The accuracy of the emergency feedwater flow instrumentation was explored in the restart proceeding. Staff exhibit 1, NUREG-0680, used as a requirement that each flow instrument should have an accuracy of "on the order of ± 10%."[1] Staff's evaluation noted that licensee had indicated that the accuracy would be "better than ± 5%." NUREG-0680 at C8-38 and 39. The Licensing Board addressed this issue as follows:

> The original EFW system design did not have any provision for indication in the control room of emergency feedwater flow. Safety-grade, redundant indication of EFW flow to each steam generator will be provided in the control room prior to restart. ... Licensee has committed to perform a functional test of the new EFW flow instrumentation prior to restart. ... Based upon the staff's review of Licensee's design for providing safety-grade design EFW flow indication in the control room and on the information that the flow transducers are qualified for operation in the assumed environment from a postulated main steam line break in the Intermediate Building, the Staff has concluded that Licensee is in compliance with the NUREG-0578 recommendation, in item 2.1.7.b, for emergency flow indication to the steam generators.... The Staff will verify that the flow devices are installed and suitably qualified prior to restart.

14 NRC at 1362.

To meet this requirement licensee first installed sonic flowmeters. When this type of instrument failed to operate satisfactorily during hot functional testing in 1982, licensee replaced it with more traditional

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[1]The explicit accuracy requirements were omitted from NUREG-0737, which superseded the requirements on which NUREG-0680 relied. See BN-84-088 for a full history of the evolution of this matter.

differential pressure devices. The accuracy of these latter devices is what is in question.

By letter dated November 23, 1983, licensee notified the NRC that tests performed on the EFW system indicated oscillations at low flow conditions (less than approximately 100 gpm) outside the plus or minus ten percent criteria.[2] Licensee maintained, however, that oscillations at low flows did not affect the functional capability of the EFW system or the ability of the operator to take proper action. Licensee to support this conclusion argued that accuracy of flow rate is not necessary at low flows, and that during manual takeover of the EFW system the emergency feedwater flow indication is not relied upon to regulate flow. Licensee therefore concluded that the EFW flow indication system is acceptable and meets the applicable requirements.

On December 9, 1983, UCS responded to the GPU letter. UCS maintained that the emergency feedwater flow instruments would not meet NRC's criteria or GPU's commitment in the restart proceeding, and that in essence GPU was requesting an exemption from those requirements. UCS argued that there was no justification for such an exemption, and that TMI-1 should not be permitted to restart until it complied with this requirement by having emergency feedwater flow rate indicators with an accuracy of plus or minus ten percent. UCS maintained that the lack of reliable flow indication delays proper operation action, and prompt operator action could be required, e.g., by failure of the recirculation

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[2]This letter was provided to the boards and parties by letter dated December 6, 1983.

flow paths. UCS also argued that one of the lessons learned from the TMI-2 accident was the need to provide the capability in the control room to ascertain the actual performance of the emergency feedwater system, which requires accurate flow indicators. Hence UCS concluded that TMI-1 should not be permitted to restart until the flow indicators are shown to function with $\pm$ 10% accuracy.

Licensee replied to UCS' pleading on December 23, 1983. Licensee asserted that there is absolutely no basis for the UCS characterization of plus or minus ten percent accuracy as a "requirement" for EFW flow instrumentation, and therefore that there is no need for any "exemption request". Licensee further asserted that full EFW flow would be desired in a TMI-2 accident condition, and that oscillations at low flow were not relevant to that situation. Finally, licensee maintained that the pump recirculation paths could not fail because the controlling valves would be locked open.

On January 9, 1984, UCS responded to licensee's reply. UCS, citing staff testimony in the restart proceeding, maintained that the plus or minus ten percent accuracy is a requirement. UCS further argued that flow indication will be necessary at low flows as well as high flows, and that failure of the recirculation flow paths could require prompt operator action because: "(1) GPU has demonstrated a proclivity for failing to have valves in their correct positions; (2) there are other valves in the recirculation flow paths which, if closed, could block recirculation flows; and (3) locking open the EFW pump recirculation line valves creates an additional safety hazard." UCS maintained that the existence of other indications of EFW flow is not sufficient to

justify a less accurate EFW flow instrumentation device. UCS concluded that the lessons learned from the TMI-2 accident specifically require what TMI-1 does not have -- "emergency feedwater flow instruments meeting strict, detailed performance criteria to ensure that operators can rely on them."

Staff on April 24, 1984 issued a board notification (BN-84-088) providing staff acceptance of the emergency feedwater flow indication instrumentation installed at TMI-1. The staff "concluded that the accuracy of the flow indications available to the operator at low flows is taken into account by the plant operating procedures and is acceptable, even though the flow indication accuracy at low flows may exceed plus or minus ten percent. The initial plus or minus ten percent accuracy requirement described by the staff on the hearing record, reflects earlier staff conservatism, but is not necessary to assure plant safety."[3] Staff indicated that its review of the available information established the following:

1. The accuracy of EFW flow rate indication cited has been determined by testing.

2. This accuracy is maintained through technical specification requirements for monthly functional testing and by calibration every refueling period.

3. On EFW actuation the operator is first directed to verify that the EFW pumps have started and that discharge pressure is greater than 1010 psig.

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[3]The Director, NRR, in denying the UCS 10 CFR 2.206 petition regarding the emergency feedwater system noted the existence of this controversy and that the Commission had left undisturbed the staff's determination in BN-84-088. DD-84-22, 20 NRC ___ (1984) (Slip op. at 3 n.2).

4. The operator is then directed to verify EFW flow by observing that flow indication is greater than 120 gpm. Accuracy at this flow rate is plus or minus ten percent.

5. As OTSG level approaches the set point the operator is directed to throttle the flow control valves to low flow conditions, and to then verify flow by observing the OTSG level indication.

6. The EFW throttling criteria directs the operator, upon incore thermocouples not decreasing, to increase EFW flow to at least 225 gpm per OTSG until the OTSG level set point is reached.

7. At EFW flows below 225 gpm flow indication is not relied upon for flow control. Accuracy at this flow rate is approximately plus or minus 7.2 percent, and it is substantially better at higher flow rates.

8. The primary indications relied upon by the operator to regulate EFW flow are OTSG level (to prevent over/under filling in) and OTSG pressure (to prevent over-cooling).

Analysis

The Licensing Board did not, as UCS asserts, adopt as a condition of restart that the EFW flow instrumentation have an accuracy of ± 10%. Rather, the Licensing Board required only that safety-grade instrumentation be installed prior to restart, and that staff verify that the instrumentation is installed and suitably qualified. Staff has done this in BN-84-088.

The Commission has reviewed the analysis in BN-84-088 and finds it acceptable. The Commission notes in this regard that at no time will the flowmeter be relied on at flows at which the accuracy is less than ± 10%. The Commission does not require such accuracy at other plants at

low flow rates, and sees no reason to treat TMI-1 differently. Accordingly, the UCS request is denied.

It is so ORDERED.

For the Commission*

SAMUEL J. CHILK
Secretary of the Commission

Dated at Washington, D.C.
this 20th day of Dec, 1984.

*Commissioners Zech and Asselstine were not present when this Order was affirmed, but had previously indicated their approval.