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FROM: Northern States Power Co. Minneapolis, Minn. 55401 L.O. Mayer	DATE OF DOC: 8-4-72	DATE REC'D 8-9-72	LTR X	MEMO	RPT	OTHER
TO: Mr. A. Giambusso	ORIG 1 signed	CC 39	OTHER	SENT AEC PDR ✓ SENT LOCAL PDR ✓		
CLASS: (U) PROP INFO	INPUT	NO CYS REC'D 40		DOCKET NO: 50-263		

DESCRIPTION: Ltr re their 5-25-72 rpt.... furnishing addl info of analytical studies of the APRM performance capability....suppl info to ltr to May 25, 1972 rpt of Low APRM Gain Setting.....

ENCLOSURES:

DO NOT REMOVE

ACKNOWLEDGED

PLANT NAMES: Monticello Plant

FOR ACTION/INFORMATION DL 8-10-72 Appl

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NORTHERN STATES POWER COMPANY

MINNEAPOLIS, MINNESOTA 55401

August 4, 1972

Regulatory File Cy.

RECEIVED AUG 9 1972 U.S. ATOMIC ENERGY COMMISSION Regulatory Mail Section

Mr. A Giambusso
Deputy Director for Reactor Projects
Directorate of Licensing
United States Atomic Energy Commission
Washington, D.C. 20545

Dear Mr. Giambusso:

MONTICELLO NUCLEAR GENERATING PLANT
Docket No. 50-263 License No. DPR-22

Supplemental Letter to the May 25, 1972 Report of Low APRM Gain Setting

Our May 25, 1972 letter reported that all APRM channels were found indicating lower than the core thermal power; however, the effective safety system settings remained less than the safety limit. This situation was reported as an abnormal occurrence in compliance with Technical Specification 6.6.B.3. It should be noted that this was not a violation of Section 2 based on the discussion contained on page 18 of the Technical Specifications. This letter provides a further description of analytical studies of the APRM performance capability. Based on this work, the present Technical Specification concerning APRM calibration requirements, along with prudent calibration techniques, assures safe operation of the plant under all conditions.

The May 25, 1972 letter did not discuss the tracking accuracy of APRM channels. Each channel receives signals from 24 in-core detectors. The average of these inputs provides a good representation of the average core power. However, the fact that a finite number of discrete detectors cannot give an exact representation of average power at all times was acknowledged in the accident analysis. Section VII. 4.5.2.3 of the FSAR discusses the performance analysis of the APRM System. In part it states, "That the APRM provides valid average power measurements during typical rod or flow induced power level change has been shown by three dimensional analysis. These analyses indicate tracking accuracy of approximately 5% of a wide range of power levels." Further discussion of the tracking accuracy studies is contained in the General Electric Topical Report APED-5706, In-core Neutron Monitoring System For General Electric Boiling Water Reactors, November, 1968. In recent discussions and correspondence General Electric has confirmed that the accident analysis allows for an error in APRM tracking of bulk thermal power of 5% rated power.

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The occurrence took place during a power ascension from a shutdown condition. Under equilibrium conditions at 50% of rated power, as indicated by a heat balance, the APRM channels were calibrated. For each of the six channels the gain was decreased. Twelve hours later a heat balance indicated the reactor power to be 68% of rated. At this time the APRMs all read low; the average of the six channels being 64%. Five channels were within the 5% criteria. One channel indicated low by 7.5% of rated power. If the gain had not been decreased while at 50% power, only one channel would have indicated less than 68%; that one indicating 64.4% which was well within the 5% tracking criteria. A review of the situation showed that while at 50% power, the power shape was such that a peak occurred near one of the four detector elevations. At 68% power, having experienced changes in core flow, xenon concentration, and (most important) in the control rod pattern, the power shape was such that the peak had moved away from the detector elevation. In retrospect, it appears that during changes in the flux shape the APRM gain should not have been decreased. With the exception of this event, experience has shown that a 5% margin for APRM tracking capability is conservative. The reason for exceeding the 5% margin as reported above is that we doubly perturbed the situation; first, by calibrating the system at a time when it appeared the gain was too high and second, due to the normal tracking deviation expected for a change in power shape.

Power shape transients are most pronounced at lower power levels, where control rods are being withdrawn from the core while operating with minimum recirculation flow. Under these conditions, the flow-biased scram feature of the APRM system maintains an additional margin of safety below the 120% scram trip setting, which the FSAR demonstrates to be sufficient to preclude fuel damage during postulated transients.

From this experience we have strengthened our operating procedures in the following manner. First, we believe that the best calibration is done during steady state operation at elevated power levels where the power shape is relatively uniform at all elevations; unless the calibration check shows that the gain must be increased during power shape transients or unless some other justifiable cause for recalibration exists, a change in gain is not recommended. The APRM channels are left with a conservative bias. Second, operating instructions make the operator aware that a certain tracking deviation can be expected, and that during any reactor operation that might potentially change the power shape, the operator should frequently compare the APRM readings to the reactor power level calculated by the plant process computer or other heat balance methods. If the deviation exceeds a prespecified threshold, he is instructed to inform administrative personnel who in turn will execute the necessary steps to have the situation analyzed and corrected. The primary purpose for frequent APRM calibrations is to continually compensate for the loss of sensitivity of in-core detectors due to neutron exposure. The intention is not to calibrate the APRM system frequently enough to compensate for transient changes in the power shape. Having sufficient margin for tracking accuracy allowed in our accident analysis and recognizing this in our operation procedures, we believe that the frequency of APRM calibration required by the Technical Specifications is sufficient to preclude any unsafe conditions.

Yours very truly,

L. O. Mayer

L O Mayer, P.E.
Director of Nuclear Support Services

cc: B H Grier