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Regulator

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NORTHERN STATES POWER COMPANY

MINNEAPOLIS, MINNESOTA 55401

December 28, 1971

Dr. Peter A Morris, Director  
Division of Reactor Licensing  
United States Atomic Energy Commission  
Washington, D C 20545

Dear Dr. Morris:

## MONTICELLO NUCLEAR GENERATING PLANT

Docket No. 50-263 License No. DPR-22

Modifications to Main Steam Flow Element Throat Pressure Taps

Summary Comments

From the time of the initial rise to power of the Monticello Nuclear Generating Plant, the pressure differentials measured across the Main Steam Line Flow Elements were lower than the design characteristics of the nozzle. The design of the nozzle was reviewed and the reason for the observed behavior identified. A design modification to the throat tap was proposed and tested. The structural integrity of the modified flow element assembly has been analyzed. This modification work has been completed on the Monticello nozzles during the present outage. A special test procedure during the forthcoming startup will verify the expected characteristics of the nozzle.

Discussion

During the Monticello Startup Test Program, it was found that the pressure differentials across the Main Steam Line Flow Elements were approximately 40% of that expected from calculations. The response was repeatable, following a basic flow-squared relationship. The problem appeared to be generic for that flow element design since all four Monticello verturi nozzles, as well as those in the Fukushima I, Tsuruga, and Nuclenor Plants gave a similar response. An investigation was immediately initiated among Northern States Power, General Electric, and Permutit. It was theorized that a leakage path existed such that the full pressure differential from the upstream tap to the throat tap was not sensed by the flow switches. Tests performed by General Electric later confirmed this theory.

General Electric proposed a design modification of the nozzle to eliminate the leakage path problem. The original flow element was constructed with a piezometer ring around the circumference of the throat with eight  $\frac{1}{4}$ " holes used as pressure taps. The modification proposed to bore a one-inch hole from the point at which the instrument pressure tap entered the steam line

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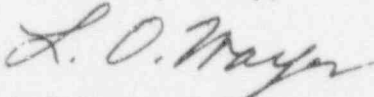
into the nozzle throat; a tight-fitting sleeve would then be inserted so as to eliminate the effect of the leakage path. Tests were conducted using a nozzle similar to the Monticello design having the proposed modification. The test results showed that the measured pressure differential agreed with the calculated value. Testing further revealed that the distance from the flow element to the nearest bend in the main steam line was sufficient to give accurate data from a single throat tap device. A stress analysis performed by General Electric has verified the structural integrity of the modified nozzle assembly.

On November 16, 1971, representatives from Northern States Power and General Electric met with Mr. Benaroya and Mr. Knuth of your organization. In accordance with the discussion at that meeting, work was initiated immediately to make the proposed modification. The installation procedure was reviewed and approved by the Operations Committee on November 19, 1971. The work was done under Permutit supervision with a qualified factory welder making the seal weld on the sleeve inserts. In addition, Quality Assurance Personnel from Northern States Power followed and documented the work very closely.

On the ascent to full power following the present outage, we will verify the flow nozzle responses in an orderly procedure to be reviewed and approved by the Operations Committee. The outline of the procedure, as discussed below, was also reviewed at the recent Safety Audit Committee meeting. The set points of the "high steam flow differential pressure" switches which isolate the reactor on high steam flow will initially be left at their present values. (This differential pressure set point corresponded to 113% of rated steam flow prior to the modification and is expected to correspond to about 71% of rated steam flow with the modified nozzle.) If data up to 60% of rated steam flow falls within the test acceptance criteria, the isolation set points will be set to the extrapolated value corresponding to 100% of rated steam flow. If the data up to 80% of rated steam flow falls within the test acceptance criteria, the set points will be set at the extrapolated value corresponding to 140% of rated steam flow. If the data up to 100% of rated steam flow falls within test acceptance criteria, the set points will be left at 140% of rated steam flow.

A detailed report from General Electric on the Main Steam Line Flow Element modifications will be forwarded as soon as it becomes available. In addition, we will notify your office of the results of special testing following our power ascent.

Yours very truly,



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

LOM/MHV/br