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FUEL FAILURES IN MONTICELLO FUEL ASSEMBLIES

This memo summarizes the information obtained to date regarding the fuel rod failures in Monticello fuel assemblies. A conference call between the NRC and representatives of Northern States Power (NSP) was held on July 1, 1975 to discuss the fuel failures observed during a recent inspection of ten dechanneled fuel assemblies from the initial core loading at Monticello (see attached list of participants). Three of these fuel assemblies selected for inspection had visual observations of failure. These assemblies had been re-constituted after the first cycle of operation and subsequently removed from the reactor after the second cycle (March 1974). The remaining seven assemblies selected had the largest leak indications based on sipping results. Visual observations during the inspection were made with an underwater TV camera and according to NSP the poor quality of the picture and the photos taken severely restricted the detail that could be seen. In addition, the notes taken during the examination were contaminated and could not be removed from the inspection area.

NSP is in the process of fabricating a borescope mount so improved visual observations can be made within the next few days (July 3 or 4th). Based on our conversations with NSP the following preliminary information was obtained:

Approximately 30 of the 40 corner rods had observable failures.

The corner rod diagonally opposite the control rod blades (nearest the instrument tubes) had the most failures.

The corner rods nearest the blade tips had the second most failures.

Few failures were observed on the corner rod adjacent to the control blade.

Cracks ranged in length from approximately 1 to 36 inches.

Cladding cracks ranged in width from hairline to as much as 1/4 inch.

In one corner rod a series of discontinuous cracks was observed extending almost the entire rod length.

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Some indications of hydriding in the form of hydride blisters were observed, however, no major blisters associated with the cracks were seen.

Hairline cracks were observed in fuel pins adjacent to some corner pins.

Most of the failures appear to be in the low enrichment pins.

Because of the equipment, only peripheral pins of the fuel assemblies could be seen.

As previously mentioned these fuel assemblies were from the initial core loading and 268 of the initial 484 fuel assemblies still remain in the core. However, all of these initial assemblies will be replaced during the scheduled October 1 refueling. Delivery of the new fuel assemblies will start July 15th and be completed by August 15th. The remaining fuel assemblies currently in the core are comprised of 20 new improved 7x7, which have been in two cycles, and 196 reload 8x8 fuel assemblies, 116 of which have been in operation 1 cycle. During the last reload (end of cycle 3), all the improved 7x7 fuel assemblies and 25% of the 8x8 reload assemblies (30) were sipped. No indication of failures for any of these fuel assemblies was observed.

The plant is currently operating at about 83% of full power and the power operating level is being controlled by the activity level at the steam jet air ejector. The plant has an augmented holdup system that appreciably reduces the activity in the off-gas prior to stack release. The activity release at the stack is approximately 10,000 ci/sec compared to the technical specification limit of 270,000 ci/sec. Preconditioning procedures as recommended by General Electric (PCIOMR) have been in use.

In summary, based on the preliminary information, it appears that failures are limited to the initial fuel assemblies containing fuel rods fabricated during a time period prior to initiation of improved design and fabrication procedures (vacuum out-gassing and gettering). In particular these failures appear to be primarily associated with low enrichment rods within the assemblies. Dresden 2 experienced a large number of fuel failures on similar vintage fuel rods; however, the fuel was removed earlier in life and the failures seen were not

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as extensive as those observed in Monticello. Additional information is needed to explain why the failures are occurring in the locations identified and the specific cause of failure.

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