

DOCKET NO.

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Dresden Nuclear Power Station
R. R. #1
Morris, Illinois 60450
May 18, 1970

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

Subject: License DPR-19, Dresden Nuclear Power Station, Unit #2,
Section 6.6.B of Technical Specifications.

Dear Dr. Morris:

This is to report a condition relating to the operation of the station in which during surveillance tests, several main steam isolation valves (MSIV) failed to close as specified in section 3.7.D.

Problem and Initial Action

This situation was discovered at 8:10 a.m. on May 8, 1970. During the routine surveillance testing as required by section 4.7.D.1.C, main steam isolation valve 2D would not close on test. Valve 2B had been closed since April 27, 1970, when, during surveillance testing the valve closed properly but failed to re-open. All other valves operated normally on routine testing on May 8. At the time 2D valve failure was observed, the reactor was subcritical and at 183 psig pressure. At 10:20 a.m. additional valve testing was performed in the fast-full closure mode by actuation of the operating switches. This test showed that 1C, 2A, 2C and 2D would not close in the mode. 1C therefore, was closed by the test switch (a spring return switch) and held closed by a jumper on the test switch wiring terminals. This action provided a closed valve or an operable valve in each steam lead. An orderly shutdown was also initiated and all withdrawn control rods inserted by 12:10 p.m. and reactor system cooling was continued. Reactor water temperature was 195°F and the reactor vented at 10:20 p.m.

Investigation

Investigation of the cause of valve failure was immediately initiated. The operating pilots for the outboard valves 2A, 2C and 2D, were found stuck and were replaced with new pilots. The 1C operating pilot was cleaned and reinstalled. The manufacturer's representative reviewed at Dresden, the condition of the three removed pilot valves with General

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Electric site and engineering personnel and Edison personnel, and observed operation of the 2A MSIV prior to removal of the stuck pilot. The operating pilots for valves 2A, 2C and 2D were taken back to the manufacturer's plant for detailed inspection and testing by the Designers.

The pilot valve material for both the spool and mating inner cylinder is 440C stainless steel with hardness of 62 Rockwell-C. The clearance between these mating parts is on the order of 0.00015 inches and is air lubricated by the leakage of control air through the spool cylinder clearance. The manufacturer of the pilot valves; Numatics, Inc, ran a series of tests in 1967 on the effect of high temperature on the pilot valve operability. A maximum tolerance valve and a minimum tolerance valve were heated to 310°F and cycled for 30 minutes. When they cooled, the maximum tolerance valve still operated; the minimum tolerance valve stuck. As a result, in October, 1967, Numatics began supplying only maximum tolerance pilot valves for main steam isolation valve usage, until October, 1969, when their manufacturing processes were upgraded to provide greater control of roundness and straightness and tests indicated a return to previous dimensional tolerances could be made. The pilot valves for D-2 and D-3 were supplied before October, 1967. The manufacturer is supplying all new pilot valves manufactured by the new technique to replace all the pilot valves for Dresden Units 2 and 3. *when?*

Corrective Action

Further site inspection and cleaning of all pilot valves were conducted to assure adequate initial clearance and freedom of movement. After reassembly, all the MSIV's were operated satisfactorily in both the test and fast operating modes and timing found to be proper.

Corrective action was taken to reduce pilot valve operating temperatures consisting of adding insulation to hot system components in the area of the valves. In addition, the outboard valves (which experienced higher ambient air temperature than the inboard valves) were provided with coils through which cooling water can be circulated. This cooling flow will be applied if the valves exceed the manufacturers recommended limit of 175°F. These pilot cooling coils surrounding the pilot valves were covered with insulation to maintain pilot valve temperatures lower than previously experienced.

Monitoring and Testing Program

A new testing procedure was established to exercise the MSIV to the full closed position. This test procedure will provide information assuring full closure operation of the valves throughout the 75% power testing phase of the startup tests during which steady state temperatures of the valves will be achieved. Experience gained during this period will be utilized to evaluate the valve testing program and define any future corrective measures or testing which may be required.

In addition to test and fast closure actuation and timing of the valves completed after inspection as noted above, testing by the new procedure has been conducted under hot operating conditions following

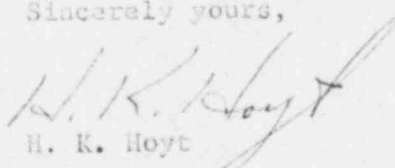
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Unit 2 reactor startup at 8:38 p.m. on May 11, 1970. Valve performance during all testing subsequent to corrective action has been satisfactory. Dates of these tests and pilot valve temperatures are as follows:

5/10/70 90°F
5/11/70 125°F
5/12/70 142°F
5/13/70 143°F
5/16/70 144°F

These valve temperatures are obtained by temporary thermocouples installed on one inboard and one outboard pilot valve representative of all pilot valves. Ambient air adjacent to the outboard pilot valve is within 2°F of the metal temperature itself indicating that the added insulation has done an effective job of limiting valve temperature. Inboard valve area temperature is normally about 100°F. The cooling water to the outboard MSIV pilot valve cooling coils has not been applied, since valve temperatures have been well below 175°F without supplementary cooling.

Sincerely yours,


H. K. Hoyt