



June 28, 1973

Mr. John F. O'Leary, Director
 Directorate of Reactor Licensing
 U.S. Atomic Energy Commission
 Washington, D. C. 20545

RE: TURKEY POINT UNIT NO. 4
 DOCKET NUMBER 50-251
 ABNORMAL OCCURRENCE NO. 4-73-7
FAILURE OF AUXILIARY FEEDWATER PUMPS TO AUTO START

Dear Mr. O'Leary:

I. INTRODUCTION

This report is submitted in accordance with Technical Specification 6.6.2.a for Turkey Point Unit No. 4, Operating License No. DPR-41. This Abnormal Occurrence Report 4-73-7 describes an abnormal occurrence which was identified on June 18, 1973. The Directorate of Regulatory Operations, Region II was notified on June 19, 1973.

II. DESCRIPTION OF THE OCCURRENCE

On June 18, 1973, Turkey Point Unit No. 4 was undergoing startup and low power physics testing in accordance with approved operating procedures, testing procedures, and the Technical Specifications. About 5:16 p.m., while increasing speed on Unit No. 4 turbine-generator in preparation for initial synchronization with the transmission system, the turbine control valves opened rapidly and excessively. As the result of high steam flow for this mode of operation and decreasing average reactor coolant temperature, the Safety Injection System actuated when the average coolant temperature was less than 543 F. Unit No. 4 reactor and turbine-generator tripped upon actuation of the Safety Injection System. All of the Engineered Safeguard Systems were verified to be operating normally except that automatic start of the auxiliary feedwater pumps did not occur. The Nuclear Control Center Operator promptly started the three auxiliary feedwater pumps manually in accordance with approved operating procedures. All three auxiliary feedwater pumps started and operated normally. Unit No. 4 reactor was placed in the hot shutdown condition pending review, analysis, and evaluation of the cause of the failure of the auxiliary feedwater pumps to start automatically upon actuation of the Safety Injection System.

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III. ANALYSIS OF THE OCCURENCE

An investigation by plant personnel to determine the cause of the failure of the auxiliary feedwater pumps to automatically start upon actuation of the Safety Injection System revealed that the 125 VDC power supply fuses for the auxiliary feedwater pump auto start logic circuit were not installed.

IV. CORRECTIVE ACTION TO PREVENT RECURRENCE

The initial corrective action was to replace the 125 VDC fuses in the auxiliary feedwater pump auto start logic circuit and check for proper operation. The auto start logic circuit was demonstrated to be operable.

The 125 VDC fuses in the auxiliary feedwater pump auto start logic circuit are under administrative control as specified in Administrative Procedure No. 0103.4, In-Plant Equipment Clearance Orders. Before these fuses can be removed an In-Plant Equipment Clearance Order must be issued. Strict adherence to In-Plant Equipment Clearance Procedures will prevent recurrence of this and similar incidents.

V. ANALYSIS AND EVALUATION OF SAFETY IMPLICATION OF THE OCCURENCE

Turkey Point Unit No. 4 reactor achieved initial criticality on June 11, 1973, and had been undergoing low power physics testing. The residual heat in the core was at a very low level at the time of the incident. Further, the average reactor coolant temperature was about 547 F at the beginning of the initial turbine roll and decreased to a value less than 543 F at the time of the reactor trip. When Safety Injection System actuation occurred, the turbine control valves closed immediately which prevented steam withdrawal from the steam generators. Actuation of the Safety Injection System closed the main steam stop valves immediately, closed the feedwater control valves (main and bypass), tripped the main steam generator feedwater pump and closed the steam generator feedwater pump discharge valves which isolated the feedwater-steam system. Actuation of the Safety Injection System should have automatically started the three auxiliary feedwater pumps to supply approximately 600 gpm feedwater from each pump to the steam generators.

As a result of these prompt actions to isolate the main steam system, Unit No. 4 average reactor coolant pressure and temperature was not significantly reduced below the pressure and average coolant temperature expected for a reactor trip on a reactor core with a low power operating history. The average reactor coolant temperature did not increase again following the reactor trip, due to the low level of decay heat present in the core. Steam dump was not immediately required to control main steam pressure or average reactor coolant temperature. In the absence of steam dump from the steam generators, coupled with the relatively large water inventory present in the steam generators at the time of the reactor trip, steam generator water level was easily maintained. Because the steam generator water level was not rapidly depleted, feedwater addition by the auxiliary feedwater pumps was not immediately required.

Upon actuation of the Safety Injection System, all four safety injection pumps started and operated normally. The boron injection tank inlet and outlet valves opened automatically to provide a flow path for highly borated water to the reactor core. Because the Safety Injection System pressure operates at a much lower pressure than the normal operating pressure of the reactor coolant system, there was no flow of borated water into Unit No. 4 reactor coolant system due to this incident.

Prompt operator action in starting the auxiliary feedwater pumps manually, assured that the steam generator water level was maintained within normal operating range.

Based on an analysis of the conditions stated above, the failure of the auxiliary feedwater pumps to automatically start did not adversely affect the safe operation of Unit No. 4. The prompt manual start of the auxiliary feedwater pumps demonstrated that the auxiliary feedwater pumps were operable and actually delivered feedwater flow to the three steam generators in less time than the time specified in the safety analysis.

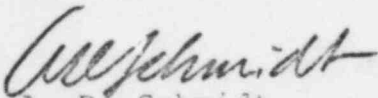
VI. CONCLUSIONS

- a. The failure of the auxiliary feedwater pumps was a result of the 125 VDC power supply fuses for the auxiliary feedwater pump auto start logic circuit not being installed.

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- b. Strict adherence to Administrative Procedure No. 0103.4 will prevent recurrence of this and similar incidents.
- c. The prompt manual start of the auxiliary feedwater pump demonstrated that these pumps were operable and actually delivered feedwater flow to the steam generator in less time than the time specified in the safety analysis.
- d. The Safety Injection System nozzles and piping were not subjected to thermal stresses since no flow occurred in this system.
- e. This failure of the auxiliary feedwater pumps to start automatically did not adversely affect the safe operation of Turkey Point Unit No. 4.
- f. This abnormal occurrence did not present any danger to the public health or safety.

Very truly yours,



A. D. Schmidt
Director of Power Resources

ADS/JKH/VTC/HNP/paz

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