

SAFETY EVALUATION OF THE  
PROPOSED ACTIONS  
REGARDING BWR FEEDWATER  
PUMP TRIP ON REACTOR HIGH WATER LEVEL

Introduction

An NRC letter dated February 1, 1978, regarding a concern of flooding of main steam lines or lines to other safety related equipment on BWRs, was transmitted to the licensees of the following six BWR units: Big Rock Point - 1, Dresden - 1, Oyster Creek, Nine Mile Point - 1, Millstone - 1, and Pilgrim - 1. The letter referenced a report entitled "Evaluation of Incidents of Primary Coolant Release from Operating Boiling Water Reactors" issued by the U. S. Atomic Energy Commission on October 30, 1972 in which the regulatory staff reported the results of a study of eight incidents involving the unintentional discharge of primary coolant through safety and relief valves during reactor operation. One of the staff recommendations resulting from this study was that the BWR feedwater control system should be designed to automatically control reactor vessel water level during anticipated transients without flooding of the main steam line or the lines to safety-related equipment. The installation of an automatic feedwater pump trip function on reactor vessel high water level for most operating BWR-3 and BWR-4 facilities has satisfied the intent of the staff's recommendation in this regard.

The February 1, 1978 letter requested that the licensees for the above six sited facilities transmit their plans for addition of the automatic feedwater pump trip. Consumers Power Company (CPCo) responded to our request by a letter dated March 7, 1978. In their response CPCo indicated that they do not plan to install a feedwater pump trip because their technical review indicated that such a trip is neither necessary or desirable. Our evaluation of CPCo's submittal is detailed below.

Discussion

The feedwater control systems of Big Rock Point has operated reliably for 16 years with no known problems relating to inadvertant flooding of the primary steam drum. The three-element (steam flow, feedwater flow and steam drum water level) feedwater control system is designed to maintain drum level within  $\pm 1$  inch of the programmed water level during steady state operation and to handle plant load swings resulting in reactor trip on low drum level.

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The steam drum has a high free volume and because of this the potential for completely filling the drum and overpressurizing the primary system is low. We have reviewed the potential scenarios for filling the reactor steam drum. In these scenarios, the operator would receive an alarm at 4 inches above normal high reactor water level. This alarm would direct him to reduce feed flow.

For operating Cycle 15, Big Rock Point is exempt from the requirements of 10 CFR 50.46 and Appendix K, when applied to LOCA caused by a break in the redundant core spray line. This exemption was granted, in part, based on the reliability displayed by the feedwater system both in operation and capacity. Any modification to install additional trips to the reactor feedwater pumps would tend to lessen the overall reliability of the system to perform under LOCA conditions.

Recently the licensee has reported a discharge of primary coolant through their safety/relief valves during shutdown conditions. This condition was achieved while the feedwater control system was in manual control. The operator was using an inoperable instrument to control level. There is diverse instrumentation for this purpose but the operator did not use it. Therefore, this incident was caused by the combination of single failure and operator error. After the transient the licensee discussed its implications with the safety/relief valve supplier and decided to examine the two safety/relief valves which were actuated. The licensee found one of the valves damaged (the setpoint had drifted substantially) and replaced it. The licensee is reviewing the event with their operating staff.

Since the event was due to a combination of an error and failure from the shutdown mode and there has been no occurrence of this type during plant operation, the original point of concern (discharge during operation) is not relevant. The licensee acted responsibly in the investigation of the event consequences. We believe that no further action is required either on a plant specific basis or generically, because of the industry wide awareness of the potentials and consequences of such an event, and because of the unusual circumstances required to achieve such an event.

Based on these reasons we find the action taken by CPCo acceptable.

#### Conclusion

In the report entitled "Evaluation of Incidents of Primary Coolant Release from Operating Boiling Water Reactors" issued by the U. S. Atomic Energy Commission on October 30, 1972, the following suggested performance objectives for the feedwater control system were identified by the staff:

1. The maximum water level attained should not initiate isolation of any safety feature, such as the high pressure coolant injection system, or disable any system or component required for the orderly shutdown of the reactor and
2. The minimum level attained should not require the activation of any safety system.

The primary feedwater system of Big Rock Point - 1 is required to perform the high pressure coolant injection function during certain LOCA events. Hence the positions taken by these licensees in not tripping the feedwater pump on reactor high level is consistent with performance objective (1) above.

Therefore we conclude that CPCo's decision not to install a feedwater pump trip is acceptable.