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Revise EOS-016.2 TO INCORPORATE Recommendations on ALL CONTRACTS

THE BABCOCK & WILCOX COMPANY
POWER GENERATION GROUP

To
Jim Taylor, Manager, Licensing

From
Bert M. Dunn, Manager, ECCS Analysis (2138) Bert M Dunn

Cust.

File No. or Ref.

Subj.
Operator Interruption of High Pressure Injection

Date
February 9, 1978

This letter to cover one customer and one subject only.

This memo addresses a serious concern within ECCS Analysis about the potential for operator action to terminate high pressure injection following the initial stage of a LOCA. Successful ECCS operation during small breaks depends on the accumulated reactor coolant system inventory as well as the ECCS injection rate. As such, it is mandatory that full injection flow be maintained from the point of emergency safety features actuation system (ESFAS) actuation until the high pressure injection rate can fully compensate for the reactor heat load. As the injection rate depends on the reactor coolant system pressure, the time at which a compensating match-up occurs is variable and cannot be specified as a fixed number. It is quite possible, for example, that the high pressure injection may successfully match up with all heat sources at time t and that due to system pressurization be inadequate at some later time t_2.

The direct concern here rose out of the recent incident at Toledo. During the accident the operator terminated high pressure injection due to an apparent system recovery indicated by high level within the pressurizer. This action would have been acceptable only after the primary system had been in a subcooled state. Analysis of the data from the transient currently indicates that the system was in a two-phase state and as such did not contain sufficient capacity to allow high pressure injection termination. This became evident at some 20 to 30 minutes following termination of injection when the pressurizer level again collapsed and injection had to be reinitiated. During the 20 to 30 minutes of noninjection flow they were continuously losing important fluid inventory even though the pressurizer indicated high level. I believe it fortunate that Toledo was at an extremely low power and extremely low burnup. Had this event occurred in a reactor at full power with other than insignificant burnup it is quite possible, perhaps probable, that core uncovery and possible fuel damage would have resulted.

The incident points out that we have not supplied sufficient information to reactor operators in the area of recovery from LOCA. The following rule is based on an attempt to allow termination of high pressure injection only at a time when the reactor coolant system is in a subcooled state and the pressurizer is indicating at least a normal level [illegible] breaks. Such conditions guarantee full system capacity and thus assure that during any follow on transient would be no worse than the [illegible] accident. I, therefore, recommend that operating procedures be written to allow for termination of high pressure injection under the following two conditions only:

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1. Low pressure injection has been actuated and is flowing at a rate in excess of the high pressure injection capability and that situation has been stable for a period of time (10 minutes).

2. System pressure has recovered to normal operating pressure (2200 or 2250 psig) and system temperature within the hot leg is less than or equal to the normal operating condition (605°F or 630°F).

I believe this is a very serious matter and deserves our prompt attention and correction.

BMD/lc

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