LOR 01-2

SG0070 Revision 1 Attachment

Unit 2 Reactor Trip Data (2/6/01)

The purpose of this attachment is to share operating experience from the Unit 2 reactor trip that occurred on February 6, 2001. This is the first trip experienced from full power since the RCS pressure upgrade was implemented.

AFW Control:

OI-62A contains five specific instances when the discharge MOVs should be placed in "manual:"

1. Isolation of a faulted or ruptured SG
2. Startup, shutdown, or going to or from a drained condition where narrow range SG level is expected to be below the lo-lo level setpoint, and RCS temperature is less than 350 °f.
3. Approved special testing.
4. When absolutely necessary to defeat the automatic shut signal to the other unit's MOV (in the same train).
5. During concurrent automatic AFW actuation to both units where it may be expected that one motor driven AFW pump could be selected to supply one Unit 1 SG and the other is selected to supply one Unit 2 SG.

When we "control" AFW flow (even temporarily reducing it to zero) we should use the discharge pressure control valves.

When we "isolate" AFW flow (such as for a ruptured or faulted SG) we should use the discharge MOVs and maintain the discharge pressure control valves in automatic.

When we "secure" AFW in EOP-0.1, we should be returning it to its SI ready lineup.

ITS makes allowances for the system to be operable when operating under these conditions and entry into 15.3.0 or 3.0.3 is not required.

Systems Response:

Crossover steam dumps actuated to prevent turbine overspeed. While this function appears to have worked, the system response was not ideal in that condenser vacuum was rapidly lost. The vacuum was off the narrow range within about 15 seconds and was near atmospheric pressure conditions within 1.5 minutes.

Condenser steam dumps responded via the turbine trip circuit and appeared to have reduced RCS Tavg to about 540.3 °f as opposed to 547°f. Temperature remains relatively stable for a short time and then markedly lowers at a steady rate upon actuation of AFW on lo-lo SG level. The lowest temperature was approximately 535 °f.

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There was a disparity in indicated AFW flowrates even though SG pressures were consistent with one another. Flowrates to the "A" SG were about 100 gpm higher than those observed to the "B" SG. It appears that the steam driven AFW pump discharge MOV was aligned to the plaque but not under flow conditions, resulting in the valve being open further than the ideal setting.

As a result of the cooldown, we isolated letdown and lost heaters at 12% pressurizer level. Actual level bottomed out at approximately 11%. Remember that a manual SI is required at 10% level. A couple of things to keep in mind are: charging flow is not addressed until step 10 of EOP-0.1; if we get the condenser steam dump circuit working ideally, we won't have as dramatic a cooldown and will be further away from SI requirements; and the Pressurizer Level Setpoint Deviation ARB gives guidance to start charging pumps and adjust flow as necessary to restore pressurizer level to program.

The RCS temperature control steps in EOP-0.1 (step 1) are continuous action. Although the primary concern when this step is reached is likely to be reducing AFW flow to stop the cooldown, we also need to understand that once AFW flow is secured, decay heat and RCP heat will act to cause RCS temperature to rise. With the loss of condenser vacuum, we needed to control temperature by dumping steam through the atmospheric steam dump valves. The setpoint of these valves is 1050 psig where as our desired no load temperature would have us maintain 1005 psig. For this trip, temperature actually climbed to 556 °f with a corresponding SG pressure of 1056 psig.

Each of the items of concern are being addressed by CR follow up and/or the RCE to ensure that these issues are properly addressed.