From: Paul Fillion , R2
To: Charlie Payne; Kathleen O'Donohue
Date: 2/4/04 10:56AM
Subject: Analysis of Two Valves

The attached file contains my work on the analysis of two valves. It is not yet complete, I still need to look at switchgear room fire in the short term and then long term consideration for each of the four fire areas chosen. The review is taking longer than anticipated, but must be done right. Once we get these two valves right, the other valves we put on the plan should fall into place quickly. Please review and comment.

CC: Gerald Wiseman; Necota Staples

14-12

(13)

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From:	Paul Fillion
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KFO (Kathleen O'Donohue)
NLS2 CC (Necota Staples)

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TURKEY POINT 2004 TFP INSPECTION
DISCUSSION OF
VCT OUTLET VALVE
AND
RCP THERMAL BARRIER CCW SUPPLY ISOLATION VALVE
by
Paul J. Fillion

LCV-3-115C

There is only one volume control tank outlet valve at Turkey Point, as opposed to the standard two valves in series. The number of this valve is LCV-3-115C for Unit 3. It is a motor operated valve powered from motor control center 3B, which is in Fire Area T63, the control rod drive room. Of course, the valve is open during normal at power operation.

The 115C valve has two post-fire shutdown functions. Early on, i.e. from fire initiation to realignment to the RWST or BAT, the function is to remain open to maintain flow through the running charging pump. Later, i.e. to achieve realignment to the RWST or BAT, the function is to close and remain closed. These specific functions relate to the larger shutdown functions of inventory control, reactivity control and RCP seal protection.

The Essential Equipment List states that the valve is important to hot shutdown, cold shutdown and alternative shutdown.

Review of the control circuit and the cable routing leads to the conclusion that a short-circuit between two wires within the same cable or inside a panel in either Fire Area T63 or in the control room, Fire Area MM106, could cause the valve to spuriously close. It is also observed that valve LCV-3-115B, the RWST to charging pump suction header valve, is designed to close when the VCT outlet valve starts to close. However, no credit is given for this automatic transfer for the control room fire because circuitry for both the 115C and 115B could be subject to the same control room fire. Cable routing will have to be reviewed to determine if automatic transfer could be affected by the MCC room fire. A fire in the Train B 4160 V switchgear room could lead to loss of Train B power, and therefore loss of power to operate the 115C valve.

The licensee's Safe Shutdown Analysis (SSA) recognizes the potential problems with spurious closure of 115C, and resolves the issue by specifying manual actions. For the control room fire, the SSA specifies immediately stopping charging pump 3B (and also 4B) before leaving the control room and re-establishing charging per ONOP-105. For the fire in the MCC room, the SSA specifies manual action #343, which is really swap over to the RWST source. CR 03-1330, which addresses licensee identified problems with RCP seal protection, summarizes required actions and procedures required to protect the seals for each fire area. I made the point to the Bharat Thaker that the CR supercedes the SSA. Bharat said it did not. Since the CR and the SSA don't match, this issue bears further investigation. The CR only recognizes alternative shutdown for the control room fire. For fire in the MCC room, the CR specifies immediately tripping charging pump 3A, de-energizing MCC 3B, and verifying CCW valves 626 and 716B are open [3 min/20min], de-energize charging pump 3B within 15 minutes and start charging pump 3A or 3C within one hour.

MOV-3-716B

This is the RCP thermal barrier CCW supply isolation valve. It is a motor operated valve powered from motor control center 3B, the same as 115C . This valve is open in normal at power operation, and its shutdown function is to remain open.

Review of the control circuit and cable routing leads to the conclusion that a short-circuit between two wires within the same cable or inside a panel in either Fire Area T63 or in the control room, Fire Area MM106, could cause the valve to spuriously close. The control circuit also shows that the valve can be operated from the alternate shutdown panel after operation of a transfer switch.

For the CR fire, the SSA states that electrical isolation is provided. For the MCC room fire, the SSA specifies manual action #217, which is actually a three-part action. First, trip RCPs if valve closes; second, open and disable feeder breaker to MCC; and third, if possible verify locally that VV is open (3 min/20 min). For the switchgear room fire [note Unit 3 SWGR room is not on the inspection plan, so I will look at Unit 4 for discussion purposes] the SSA specifies xxxxxx. CR 1330 specifies the following: Trip charging pump A, use RCP trip criteria in ONOP 41.1, de-energize valve breaker and verify valve open (3 min/20min), and start charging pump A within one hour. The CR also refers to some errors in the analysis with respect to this valve.

Short Term Considerations

Control room fire where operators remain in control room

Since procedure (which one?)calls for immediately switching away from charging pump 3B to either charging pump 3A or 3C upon recognition of a fire, the charging pump is protected from damage and would be available for use at the alternate shutdown panel. All RCP seal cooling would be interrupted if the VCT outlet valve closed and CCW valve 716B spuriously closed (two spurious operations). However, spurious operation of both valves is not considered credible for a smaller control room fire corresponding to a scenario where operators remain in the control room because the controls are on separate panels not near each other. Spurious closure of the VCT outlet valve could cause damage to either charging pump A or C, but this event is not considered crucial to safe shutdown.

Control room fire where decision is made immediately to abandon the control room

In this scenario, operators are following ONOP-105, alternate shutdown. The larger control room fire holds the possibility that both the VCT outlet valve and the RCP thermal barrier CCW valve could spuriously close. This procedure, as it existed at the start of the inspection allowed 15 minutes to get the alternate shutdown facility operational. Then would have performed operational steps to reestablish RCP thermal barrier cooling 3 minutes later. The design concept of this procedure in effect had an underlying assumption that two spurious operations terminating all RCP seal cooling would not take place for a period of about 18 minutes

immediately following initiation of a fire. The inspection team questioned this concept, pointing out that loss of all RCP all seal cooling should be assumed at about T=7 minutes for the large fire scenario and that RCP seal maximum allowable temperature for a running pump could be exceeded well before 18 minutes. The licensee agreed that their procedure was inadequate in this regard and they instituted a standing order to manually deenergize the 716B valve within three minutes of initiating ONOP-105. This new procedure was accepted by the team as being timely enough to protect against RCP seal damage, and a seal LOCA, given a reasonable delay time between fire initiation and two spurious operations occurring.

MCC room fire

Valves 115C and 716B can spuriously close due to fire induced short circuits. If a reasonable "grace period" is assumed, then procedures specified in CR 03-1330 (i.e. immediately de-energizing MCC 3B and tripping charging pump 3A) would suffice to protect the charging pump and maintain RCP seal cooling. Note that manual opening of valve 716B after a spurious closure may be a problem due to torque switch bypass.

4160 switchgear room B fire

Long Term Considerations