From: Steven Long NRR
To: Patrick O'Reilly, Sunil Weerakkody RES
Date: 1/23/01 7:40AM
Subject: Partial Draft of Answer to IP2 Anonymous Qs

Sunil & Pat,

The attached file has the material I worked-up on the calculations actually done and the quantification of effects that they did not incorporate. Please give me any comments or suggestions on that while I work on finding out what the SDP process currently is supposed to do with overlapping conditions in general. I'll give you guys a chance to see the expanded draft, too (as soon as I can get the information fo expand it).

Steve

J151

What calculations were done:

Sunil is evaluating the CCDP for the August 1999 LOSP event. He is considering the potential for SGTR to complicate the sequences that would lead to core damage and make them more likely, but does not see that there is much significance to the overall CCDP. He is not trying to calculate the CLERP, but does understand that the tube degradation that existed at the time of the event would increase the fraction of CCDP that is CLERP.

Pat is calculating the CCDP for the February 2000 SGTF event. He is not now trying to include the effects of an elevated potential for a LOSP and potential SBO following reactor trip. If that were to be included, it would require some evaluation of the probability for the February event to be the first trip since the miscalibration set up the consequential LOSP upon trip. A logical way to do that would be to use 1-exp(-lambda x t) where lambda is the trip frequency and t is the period between the calibration problem and the SGTF event. On the other hand, if the flaw that was missed was weaker when the inspection occurred, it could have failed sooner, compared to the miscalibration event. Perhaps 0.5 is as close as we can get to the probability that these two problems would have compounded each other. Pat also is not attempting to calculate a CLERP.

Tom Shelosky, in Region I, did attempt to calculate a CCDP and CLERP for a hypothetical event in which the LOSP conditions of the August event were assumed to occur following the trip associated with the February SGTF event. He found that the effect was not great (39% increase) because the actual failures during the August LOSP event did not preclude mitigation of the February SGTF event. He did include the effects of complications such as increased human error rates due to greater complexity and operator stress levels. He did not include some of the factors that RES has considered that lower the final results, so his numerical results are more useful from a relative importance perspective. If we apply a probability factor of 0.5 to account for the events occurring together, the effect would be only about a 20% increase in the CCDP and CLERP for the tube failure, alone.

I tried to estimate a ΔCDF for the last year of the period of operation with the degraded tube strength. I included the potential for spontaneous rupture, pressure induced rupture and thermally induced rupture on CDF and LERF. However, in doing so, I did not include the higher frequency for core damage due to SBO from the conditions that existed until they were revealed by the August trip and LOSP event. Including it would substantially affect my LERF calculation, but insignificantly affect my CDF results. If I used the "high/dry" portion of the (current draft) ASP CCDP for the LOSP event, rather than the normal LOSP contribution to CDF, I would have a "high-dry" CDF of at least 4.6×10^{-5} for the last year of plant operation, instead of the 1-to-2 x 10^{-5}/RY value used in the significance determination process.

Do these calculations fully capture the risk of the plant operations:

The questions raise the issues: 1) would including these effects more fully change our regulatory decisions for this situation at this plant, and 2) could they be important factors for other regulatory decisions at other plants?

I think it is clear that, for Indian Point 2, the resulting separate yellow and red findings for the new reactor overnight process put the plant into our most vigorous regulatory response framework, so the method didn't result in an under-response in this case. If the weakened tube

was included in the SDP for the LOSP event, it would have produced a ΔLERF that would have been in the "red" range instead of the "yellow" range. If the SBO frequency implications of the LOSP event were included in the SDP for the tube failure event, the range of results for the sensitivity case analysis would have been entirely within the red range, instead of bracketing the red/yellow threshold.

However, for other cases where the results may be a pair of "whites" or a "white" and a "yellow," when evaluated separately, there may be potential for a "red" when taken together. That could change our regulatory response. So, we intend to reevaluate our procedures to make sure we don't miss such cases if they arise.