From: Steven Long NRR
To: Patrick Milano, Timothy Frye NRR
Date: 2/7/01 1:40PM
Subject: Re: IP2 question 4

Pat,

Please be advised that I am sure that Tim is incorrect in stating that it would be improper to consider the potential for the complicated LOSP events to have complicated the SGTF event. There is currently some muddled thinking that mixes policy based on DBA single failure considerations with risk assessments. There is also some muddled thinking that mixes the CCDP and delta-CDF concepts used for assessment of events and findings, respectively. This is evident in the discussion about not using "hypothetical" events or conditions for SDP (ie, risk assessment) and also in the direction to calculate the combined effects of overlapping conditions, but assign colors to each on a separate basis (not clear how to do that without double-counting). In addition, Tim's write-up neglects the LERF aspects of the overlap, which are not trivial, like the CDF aspects are.

For your info, in addition to the forst attachment from Tim, I have attached a file that describes what was done in the risk assessments for IP2 and what was missed by those calculations. Tim had that, but doesn't seem to be including the important concepts. I think we owe the questioner a less defensive, more complete answer.

This issue appears to be bigger than an IP2 question, since it doesn't really affect the results of the IP2 oversight decisions. I am now seeing it on multiple fronts, so we will need to address it properly.

Steve

>>> Timothy Frye 02/07 1:16 PM >>>
Pat,

Attached is my first cut at answering question 4. I am still working with Steve Long to determine how we should address the SDP aspects of the answer. We will probably have to sit down next week with Peter Koltay/Doug Coe to discuss the SDP and how the process can/should address this issue. So the section that is currently bolded is subject to change

CC: Gareth Parry

J 155

4. **Is the revised reactor oversight process faulty with it's focus on a single event? - Isn't it a better indicator of the overall plant performance to include some recent past history? A "good performer" would be much less likely to have two events in a row that had significance. IP2 may be one of the worst "combination" of events ever. It wouldn't be a major effort to look back on previous trip or two at a plant involved in a potentially serious event.**

The new reactor oversight process (ROP) is not focused on a single event, and does use recent plant history as an overall indication of plant performance. Through the use of an "Action Matrix," the assessment process integrates numerous inputs reflecting recent plant history to identify declining licensee performance that warrants increased NRC interaction. The inputs to the "Action Matrix" include both performance indicators (PIs) and inspection findings.

Each of the 18 PIs included in the ROP are based on at least 12 months of data to calculate the indicator, with several of the indicators based on 24 or 36 months of data. This allows recent plant events and issues to be integrated in a meaningful way, with the data applied against thresholds to indicate when additional agency action is warranted. For example both the August 1999 and February 2000 reactor trips were counted in the Unplanned Scrams PI, and resulted in this PI crossing the Green/White threshold for the 2nd quarter 2000, indicating the need for increased regulatory oversight above the baseline inspection program.

In addition, each inspection finding is evaluated through the Significance Determination Process (SDP) to characterize the risk significance of the issue. The SDP does require that concurrent performance deficiencies be assessed collectively to determine the total contribution to change in the core damage frequency (ΔCDF). This allows the collective assessment of a combination of different deficiencies that although may have been discovered at different times, occurred concurrently and impacted licensee performance. However, the SDP evaluation must be based on known existing facts and should not include hypothetical failures. For example, in evaluating the risk significance of the February 2000 steam generator tube failure (SGTF), it would be inappropriate to include the equipment failures that occurred during August 1999 loss of offsite power (LOOP) event, since these failures had been corrected and did not occur during the February 2000 event.

The SDP evaluation of the August 1999 reactor trip event determined that this was a Yellow finding, with substantial safety significance. The SDP evaluation of the February 2000 SGTF determined that this was a Red finding, with high safety significance and a significant reduction in safety margin. **Subsequent to the SGTF and the identification of degraded steam generator tubes, the staff re-evaluated the conditional core damage probability (CCDP) for the August 1999 event and included the potential for a steam generator tube rupture (SGTR) to have occurred during this event. The staff concluded that there was not a significant change to the CCDP for the August 1999 LOOP event when the potential for a SGTR to complicate the sequences leading to core damage were made more likely. The staff is evaluating the need for revising the SDP to account for the re- evaluation of findings when new, risk-significant deficiencies are later identified and are found to have existed concurrently with the original issue.**

The assessment process uses the "Action Matrix" to integrate these PI and SDP results and determine the appropriate level of NRC interaction based on these indications of licensee performance. The assessment process uses a 12-month rolling window of data to allow the

accumulation of risk-significant issues, which may be indicative of systemic and pervasive breakdowns in licensee performance. As described in the Indian Point 2 Assessment Follow-up letter dated October 10, 2000, the PI and inspection finding data collected over the previous year indicated that several cornerstones of safety were degraded, principally associated with the August 1999 reactor trip and the February 2000 SGTF. As directed by the "Action Matrix," this resulted in the conduct of several NRC activities above the baseline level of oversight, such as monitoring the licensees performance improvement plan and the conduct of an independent team inspection to diagnose the breadth and depth of the safety, organizational, and programmatic issues that led to the degraded cornerstones of safety.

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.