

From: Steven Long
To: Timothy Frye
Date: 2/6/01 11:18AM
Subject: Re: IP2 Qestion 4

NRR
NRR

Tim,

In your reply, below, you asked "Wouldn't a reevaluation of the Feb 00 SGTF considering the additional electrical problems be redundant to this? [reevaluation of the Aug 99 LOSP]" The answer is that it could be, depending on how it is done. There has been a long-standing (20 year) issue about relating ASP event CCDPs to average CDFs. Both redundancy and incompleteness are concerns. What we actually did for IP2 missed some of the risk contributions. What Pete Wilson told me the revised ROP now said to do in the future sounded like it would double-count some risk contributions. We do need to discuss it to decide on a reasonable way to proceed. I suggest we consider something that revises the CDF estimate for a particular period of time that includes both conditions. Still, there are questions about how to do that.

Steve

>>> Timothy Frye 02/06 7:46 AM >>>
Steve,

The words you disagree with come straight out of imc 0609. We will need to sit down with Peter Koltay and Doug Coe to straighten it out. I think that Peter is out all this week, so we will have to do it for early next week.

However, for the IP2 situation, I don't think it matters. We all agree that the Aug 99 Rx trip should be reevaluated for the effect of the degraded SG tubes (whether the SDP process accounts for this is a different question). Wouldn't a reevaluation of the Feb 00 SGTF considering the additional electrical problems be redundant to this?

I'll review what you sent, work it into my writeup, and send it to Pat. But we will have to sit down with Peter/Doug and resolve it. I don't want to make any statements about a missed evaluation or commitments on revising the SDP without talking to them first.

>>> Steven Long 02/05 10:43 AM >>>
Tim,

I keep hearing some words from RES ASP people that I do not agree with, and I see them in your writeup, too. Those are

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 event, since these failures had been corrected and did not occur during the February 2000 event.

There are two problems. The one you recognize is that the weak tube condition DID exist during the August LOSP event, but was not included in the risk assessment because it was not KNOWN at the time of the event and assessment. As such, that is a HOLE in the SDP for that event. The one you don't seem to recognize is that there was a significant potential for the trip following the SGTF event to be the first trip since the conditions were set-up to produce the LOSP on trip that was FORTUITOUSLY revealed by a SPURIOUS trip before the SGTF trip. From a CCDP (actually CLERP in this case) or a delta-CDF (actually delta-LERF in this case) standpoint, the concurrence of the two conditions is a fact that has an effect. How we chose to capture that effect in the SDP process is the issue. The questioner asked if we DO capture it. The answer is that we DID NOT. However, I think that capturing it in the SDP process for

J/54

the INSPECTION FINDINGS is the perfect place to capture it, and is permitted under the current scheme. Specifically, the SDP for the findings is a delta-CDF/LERF analysis. That can use an enhanced probability for LOSP on trip to reflect the electrical power situation that existed for a large fraction of the year, and an enhanced probability for tube rupture on SG depressurization to reflect the situation that existed with the tubes. (Actually, this requires use of a lot of sequences that aren't, but could be in most PRAs, but that is why there is a phase 3 to the SDP.)

So, I do not agree that "it would be inappropriate to include the equipment failures that occurred during August 1999 loss of offsite power event, since these failures had been corrected and did not occur during the February 2000 event." They should be included with a conditional probability that reflects the potential for the SGTF trip to be the first trip since the electrical problems were introduced.

If we can agree on this, then we can write some words for the answer. Specifically, I am thinking that we need to 1) acknowledge that we did not capture part of the risk (principally LERF) in the analyses that we did, 2) point out that it didn't make any difference in the agency response in the IP2 situation, 3) acknowledge that it might matter under different situations, particularly when the separate evaluations are not already real important, and 4) provide some guidance for future analyses that says HOW to include the risk of concurrent situations and explicitly cautions that effects on LERF need to be considered as well as effects on CDF.

I don't remember if I sent you the attached file, already. If so, pass the Geritol!

Steve

>>> Timothy Frye 02/02 8:44 AM >>>

Steve,

Here is my first shot answering question 4. The focus is on the oversight process in general, may need some additional words on the SDP evaluation (re-evaluation?) for the 2 events. Depending on what you come up with, we may need to sit down with Peter Koltay or Doug Coe to discuss how to ensure the SDP reevaluates previous findings (August 99 trip) when significant new information (SG tube defects) is later identified and found to be concurrent with the previous finding.

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 $1 - \exp(-\lambda \times t)$ where λ 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 Δ CDF 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 $\times 10^{-5}$ /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 Δ LERF 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.