From: Michael Cheok NRR
To: Hubbard, George NRR
Date: Thu, May 11, 2000 10:55 AM
Subject: ACRS response on decision criteria

Attached is a slightly modified version of Mark's writeup

CC: Barrett, Richard, Kelly, Glenn, Rubin, Mark

B1267

ACRS questioned the appropriateness of the 1 x 10^{-5}/year pool performance guideline (for a zirconium fire), which was developed from the LERF guideline in RG 1.174. This questioning was based on the possibility of large Ruthenium releases from the spent fuel fire that could impact early fatalities as well as reflecting that early fatality objectives may not be the controlling the decision criteria due to the longer Ruthenium half life (i.e. driving up non early fatality effects such as latent cancer deaths). Our conclusion in the draft final report was that, even though there are some differences in source term and timing, scenarios involving a spent fuel pool zirconium fire would result in population doses that are generally comparable to those expected from accident scenarios at operating reactors. Since an SFP fire scenario would involve a direct release to the environment, the LERF guideline was applied.

The staff reassessed these conclusions following the performance of additional consequence calculations that took into account the possibility of significant Ruthenium release fractions.

The staff's assessment showed that, when the Ruthenium release fraction was increased to 100% from the originally assumed fraction of $2x10^{-5}$, the number of early fatalities increased by approximately two orders of magnitude. However, the resulting early fatality consequences are still relatively low when compared to those from operating reactor accidents. For example, for the various source terms considered in the NUREG-1150 assessment of Surry, the conditional number of early fatalities varied from essentially zero to approximately 11. The reassessment for SFP zirconium fire consequences (assuming 100% Ruthenium release fraction, and a population distribution for Surry) indicated conditional prompt fatalities of 0.13 for the scenarios where evacuation was initiated before onset of zirconium fire.

When considering latent cancer fatalities, the staff analysis also provided a sensitivity study for total latent cancer deaths up to 500 miles with and without the increased Ruthenium release fraction. For the situation where evacuation is initiated prior to zirconium fire, latent cancer fatalities increased by approximately 17%, indicating that latent effects were only slightly sensitive to the Ruthenium release fraction. It should also be acknowledged that these long term health impacts are sensitive to public policy decisions such as land interdiction criteria for returning populations.

Based upon the above comparisons, the staff believes that the LERF developed pool performance criteria of 1 $x10^{-5}$ per year is still reasonable and appropriate. This can be concluded from the results that show the conditional early fatalities from a postulated spent fuel pool zirconium fire is bounded by the maximum observed operating reactor value, even though they increase by a factor of 100 if full ruthenium release fraction is assumed.

Additionally, the increased Ruthenium release fraction only slightly increases the number of latent cancer fatalities in comparison to the low release fraction case. However, since the potential does exist for latent cancer deaths in the tens of thousands for either Ruthenium release fraction, an appropriate low frequency performance guideline should still be maintained even though the early fatalities estimates are below operating reactor LERF estimates. Given these observations, there does not appear to be sufficient justification to revise the proposed pool performance guideline which was developed from the RG 1.174 LERF considerations. The staff will continue to consider this issue as the final report is prepared.