

REQUEST FOR ADDITIONAL INFORMATION  
LICENSE AMENDMENT REQUEST TO ADOPT  
NATIONAL FIRE PROTECTION ASSOCIATION STANDARD 805  
PERFORMANCE-BASED STANDARD FOR FIRE PROTECTION FOR LIGHT WATER  
REACTOR GENERATING PLANTS  
CALLAWAY PLANT  
(TAC NO. ME7046)

Office of Nuclear Reactor Regulation  
Division of Risk Assessment  
PRA Licensing Branch

PRA RAI 1c.

Even if unaffected by fire, new HFEs/HEPs in the internal events PRA model can still affect the fire PRA results because there may be scenarios initiated by fire where non-fire-affected HFEs/HEPs are part of the mitigation. Therefore, item (iii) is applicable to the fire PRA, but it is possible that all such HFEs/HEPs are re-evaluated in light of potential fire effects such that it was determined that there were no changes. If the latter is correct, revise the statement.

The following are questions on the new F&Os in Table 1 (note that this includes Suggestions, to cover the possibility that a Suggestion relative to the internal events PRA could have a greater impact on the fire PRA):

- (1) F&O 1-7. Can rupture of the RHR or SI system be induced by a fire, including a conditional rupture resulting from a fire-induced initiator? If so, how? It appears the F&O cites an underestimate of the rupture probability and, if this is somehow incorporated into the fire PRA, what is the effect on CDF, delta-CDF, LERF and delta-LERF, at least based on a bounding estimate, to ensure the transition conclusions are not affected?
- (2) F&O 1-13. If the updated CCF probabilities indicate increases, and these CCFs are part of the fire PRA, what is the effect on CDF, delta-CDF, LERF and delta-LERF, at least based on a bounding estimate, to ensure the transition conclusions are not affected?
- (3) F&O 4-5. Is FW availability after core damage credited in the LERF model for the fire PRA? If so, would not this then be applicable?

PRA RAI 3

The response seems to say that a copy of the LERF event tree was used only to simplify linking between the trees. However, in the response to an audit question, it is explained that a simplified version of the LERF event tree was used, what was simplified, and why this is OK. This more descriptive response should be included to the actual RAI 3 response.

PRA RAI 4f

“No Storage” and “No Hot Work” are cited as the basis for assuming a transient combustible HRR of 69 kW (98<sup>th</sup> %ile) in Area C-1, containing high-density polyethylene piping. In response to PRA RAI 23, multiple reasons were cited as the basis for the lower HRR assumption (69 kW). Which of these other factors are also applicable in Area C-1, (i.e., not just the designations of “No Storage” and “No Hot Work”). Also, the response cites changes made to

the Transition Report (LAR) reflecting an updated analysis for Area C-1, specifically Table 4-3, Att. C, Att. D and Table W-2. (Submit LAR update)

#### PRA RAI 7a

While it likely may be inferred, the RAI requested confirmation that available instruments were free from fire damage. The response cites the list of available instruments but does not explicitly state that they are free from fire damage when being credited. Provide this confirmation if correct. If not, explain the basis for taking credit.

#### PRA RAI 7c

Do the calculational results (Tables 2 through 4) reflect removal of credit for CPTs in all scenarios? If not, how would the results change if this credit were removed entirely? Note that, for the delta calculations, the credit should be removed in both the base and comparative cases.

#### PRA RAI 7e

Table 3-1 of Calculation 17671-014 is cited as providing discussion as to why completeness uncertainty does not apply to fire HRA. State explicitly this material from Table 3-1. In addition, Table 4-3, presumably of the same calculation, is cited as providing importances of applicable recovery actions. However, there appears to be no such table in the calculation. If Table 4-3 of the LAR is meant, note that this does not address HRA, but rather Fire Protection Systems and Features. Provide clarification and, if necessary, correction.

#### PRA RAI 7f

"Report the results" means that they should actually be docketed, either in this RAI response or as part of an update to the LAR, not just referenced as available in a portal document (17671-014, App. B). This includes the results for CDF, LERF, delta-CDF and delta-LERF. Provide, e.g., one of the following: (1) add the material from the portal document to the RAI response, or (2) embed this material in the LAR as updated. Keep in mind the potential effect of the response to RAI 9b on the material in 17671-014, App. B (Sensitivity #1).

#### PRA RAI 8b

Include in the results the quantitative results, if any, on both delta-CDF and delta-LERF as well, since YD-1 has an associated VFDR. (Note: It appears that the answer is no change, since the VFDR does not appear to be related to the bus ducts, but this needs to be docketed to complete the response).

#### PRA RAI 9a

At the end of the response, the response to PRA RAI 13 is cited as a basis for concluding that the results in this RAI (9a) are bounding and conservative due to failure probabilities exceeding one. In the response to PRA RAI 13, was not the evaluation performed such that the effect of probabilities exceeding one was eliminated? Also, are all the effects from the RAI 13 Response included in the changes made in performing the sensitivity analysis for RAI 9a?

#### PRA RAI 9b

When combining the risk and delta-risk increases per bin in Table 4, does the following correctly characterize how the whole-area burnup scenario contributions were included? For all the

areas assumed to contribute per a single bin, e.g., A-28, et al., to bin 15.1, or grouped bin, e.g., A-3, et al., to grouped bin 5/6/7 in Table 3, the contribution from that area was included with the corresponding bin (or grouped bin) in Table 4. That is, while for scenarios with a single ignition source the contribution arose solely from the actual corresponding bin, for the whole-area burnup scenarios the contribution arose solely from the assumed corresponding bin, as per Table 3. If this is not the correct characterization, provide what is.

#### PRA RAI 10

The repeated claim that use of 8 min as a best estimate for the time to reach maximum HRR for a trash can fire is overly conservative should be removed from the response, as it is contradicted by the evidence provided in the RAI, based on FAQ 08-0052. Note that the shift of the time from 10 to 8 min (only a 20% effect) caused the probabilities of abandoning the MCR to increase from 50% to 135%. Focus the response on the sensitivity evaluation performed, which indicates a very small increase in CDF and should bound the increase in delta-CDF.

#### PRA RAI 12

Can the MAAP run be conducted using the initial conditions from the FSAR 15.5.1.2 analysis, or the RETRAN run using the initial conditions from the MAAP analysis for S-20? If so, compare the results to show that the MAAP run is the more accurate representation of the actual scenario. The fact that the FSAR calculation may be more conservative does not necessarily account for the significant difference in timing (~27 min).

#### PRA RAI 13

Do the calculational results (Tables 2 through 7) reflect removal of credit for CPTs in all scenarios? The discussion following Table 5 suggests that some CPT credit was retained (i.e., use of 0.4 for spurious operation probability). How would the results change if this credit were removed entirely? Note that, for the delta calculations, the credit should be removed in both the base and comparative cases.

#### PRA RAI 16

The second to last sentence in the 1st paragraph includes the sentence, "During the FRE process, these conservatisms were discussed and the decision was made to retain the conservatisms in the fire PRA and attribute them to "defense-in-depth." Conservatisms in the model are not generally defense-in-depth attributes. The sentence is not needed as the later discussion does address defense-in-depth.

#### PRA RAI 17

The response explicitly defines "epsilon" but not 0.00+00. The difference between the two remains unclear and seems to overlap. The response should explicitly state when 0.00+00 is used

#### PRA RAI 19

When calculating delta risk between cases (b) and (c), i.e., with vs. without credit for an operator action, where (c) is the "ideal" compliant case (lowest risk), does the "nominal" HEP in case (b) include fire effects (and is therefore higher), leading to a greater delta risk?

#### PRA RAI 22

The statement that there is no SR to incorporate the fire modeling uncertainties into the CDF/LERF equation uncertainty is misleading, and the conclusion that CC-II is attained questionable (with respect to SR FSS-E3; SR UNC-A1, to which this RAI also applies, is either Met or Not Met). As per SR UNC-A1, an uncertainty analysis “in accordance with HLR-QU-E and its SRs in Part 2” must be performed. SR QU-E3 in Part 2 requires an estimation of the uncertainty interval of the CDF results consistent with the characterization of parameter uncertainties for CC-I, with the additional requirement to take into account the state-of-knowledge correlation for CC-II. Thus, it is not sufficient to just discuss the uncertainties on the individual parameters that contribute to CDF, but at least an estimate of the uncertainty on CDF itself is required. Provide this estimate. Note also that the term “fire modeling” as used here is not restricted to fire modeling just in the phenomenological sense, such as empirical correlations, zone models, of CDF models, but applies to all the elements that are input into the “fire risk equation” (including ignition frequency, non-suppression probability, etc.). (Note: a roll-up of the various sensitivity analyses performed in response to other PRA RAIs may form a reasonable “estimate” of the CDF uncertainty interval.)

#### PRA RAI 23

When citing as a basis for limiting the transient combustible HRR to 69 kW (98<sup>th</sup> %ile) that 69 kW is judged to be no larger than the 75<sup>th</sup> %ile fire in an electrical cabinet with qualified cable, further note, if correct, that this assumes no more than one cable bundle involved in the fire. Table E-1 of NUREG/CR-6850 reports two 75<sup>th</sup> %ile values for qualified cable, one at 69 kW (single bundle), the other at 211 kW (multiple bundles).