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<<ramsdell comments on 071807 files.doc>>

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Notes on the Southern MACCS2 files received July 18, 2007

- 1) Comparison of the VEARLY.INP file with the VEARLY.INP file received in June indicates that many, but not all, of input variables questioned in the earlier file were changed. Also some input variables not questioned in the previous run were changed.

Changed per earlier discussion: srendemp (emergency period = 1dy > 1wk), srtimhot (hotspot relocation delay time = 1dy > 0.5dy), srdoshot/srdosnorm (hot spot relocation = 10sv > 0.5 sv/normal relocation = 10sv > 0.25sv). Atmos changes: sigma-z (33m > 30.5m), all reftim (mixed 0 and 0.5 > 0.5), release height (30m > 0m), sensitivity of release height (0, 30m, toc) and release heat (1MW/segment, 10MW/segment) < 1% in pop-dose risk, site file including economic data (secpop revisions re regional eco data format for compatibility with maccs input + data base revision to assure data from correct county plus appropriate county land fraction)

Not changed: evacuation speed (value based on 4/06 evac study), delay time to sheltering (value based on 4/06 evac study), plume segments and release times based on Westinghouse ap1000 pra files.

Changes not questioned: lcancers (2.76E-2 > 0.12 cancers/sv for dose > 20 rem, in keeping with Interagency Steering Committee ISCORS 2002-02), sequence CFL max risk segment (2 > 3, recognize n.g., cs and group 7 releases for third segment largest),

- 2) The output file still does not include the output for Average Individual Risk that has been requested several times. This output is discussed in Section 6.14 of the MACCS2 user's guide.

I wasn't aware of the request. We've been presenting (in ER Section 7.2) the 0-2 mile (no population within 1-mile) early fatality individual risk (deaths per reactor year) and the 0-10 mile late fatality population cancer risk (population deaths per year per reactor year). The latter includes societal exposure (ingestion of agriculture produced + water affected in 0-10 mile range; average individual risk could be calculated from this by dividing by the 10 mile population (4737). Because of the latter, The MACCS section 6.14 Average Individual Risk does not include the ingestion pathway and is a direction average (average of 16 directional average individual risks); it can be presented if desired.

- 3) The results of the MACCS2 calculations are not consistent with intuitive expectations. For example, consider the following consequences for the 3 containment failure release modes.

Release Type	Population Dose (Sv)	Latent Fatalities	Cost (\$)	Farm Decontamination (ha)	Water Ingestion (Sv)
Early Containment Failure	7.19E+03	4.38E+02	1.10E+09	9.07E+03	2.68E+02
Intermediate Containment Failure	1.09E+04	7.04E+02	1.19E+09	1.47E+04	1.43E+02
Late Containment Failure	1.59E+04	1.05E+03	3.09E+09	3.82E+04	1.70E+01

For the first 4 for impact categories, delaying the time of containment failure increases the impact. That is not consistent with intuitive expectations. The 5th impact category (water ingestion) shows a decrease in impact with increasing delay, as expected.

I have conducted a spot review of the source terms for the release types. The core inventories and total release for Kr-85, I-131, I-132, Cs-137, and Sr-90 are consistent with the inventories and total releases for the nuclides used in the MACCS2 runs for Clinton. Therefore, I conclude that the behavior noted is the result of the way Southern has distributed the releases among the plumes, and Southern's selection of input parameters and variables. Southern has apparently used a source identified as URD for its values.

These "unintuitive" results are due to the group 7 (Y, Zr, Nb, La, Pr, Nd, Am, and Cm) release fractions (total release fraction =  $6.54E-5$ ,  $1.93E-2$  and  $1.41E-1$  for early, intermediate and late containment failures). The relative results among these three sequences are confirmed by the DCD (Appendix 1B, 72 hour results) reporting of severe accident consequences. If the group 7 release fractions were divided by 100, the consequences would be in the order of early failure > intermediate failure > late failure. The release consequence analysis was repeated using the oft-used MACCS Sample Problem A non-plant specific parameters. The relative results (late failure > intermediate failure > early failure) were maintained. URD is the EPRI technical report on the Westinghouse AP-1000 PRA Study.

- 4) While the values of the risk calculated for the Vogtle ESP site are generally consistent with those calculated for North Anna, Clinton, and Grand Gulf and indicate that risks associated with an AP1000 at the Vogtle site are small, the counter-intuitive behavior noted above raises questions about Southern's analysis that need to be resolved.