3/1/12 Uncertainty Notes
Fire

- A lot of issue deal w completeness. Move the capababilty cat xx to yy>..?? let say smoking, the issue on smoke itself have great impact, but it model as CDF, it has less contribution…
- Didn't identify new reactor, only smoke w/ digital I&C.
- Other issue identified: Development needs metrics and data
- 1st issue: plant partitioning—partition fire compartments that are lack of fire resistance need to be addressed;
- …Too big of an are to be partitioned
- Hot gasoline, can't credit for how long if it's a big area
- If you have a barrier that is sufficient to contain the fire, which is the same as the rated area, → same IE?
- Next one: equipment selection—general start w/ internal event pra, need to add aditional components, instrumentation problem that need operator actions… there's a process in the PRA procedure to ID… probably should added to the generic list…
- Fire scenario selection—PRA includes scenario w/ ignition source, conservatively = 1. But generally they throw things away… can't have ignition source and a target w/ all details. If you don't go down do the level of details, you may end up being conservative.
  - Can't run all cases w/ ignition sources; have to simplicity it.
  - how do you group them?
  - differciate level of details if it doesn't meet cap. Cat. 2.
- FSS—NUREGCR 6850 app. L hasn't been verified. Suggested to be verified.
  - As soon as you reach damage criteria, there is a time delay in reality before getting damage... Experience shows that factor of 2 to 5 times more conservative.
  - Fire growth time—treated as constant, however, the growth time may increase…big release rate; correlation between heat ?? and grow rate.. Appendix E of 6850
  - Some are has been verified, but some need new modeling tools.
  - Verified mean validated.
  - Damage criteria of different types of cables: can be variable; damage from hot gas layers, thermo set vs thermo plastic..
  - Fire wrap: installation problem, design issue, not as good as we think they are. Procedure of inspection—
  - Clarify—in fire PRA, we assumed it's perfect w/ fire wrap. …xx assumed 20mins. … impact may be small?
- FSS-D—NUREG1824: a lot of entry being yellow, ie tool not appropriate, caution.
  - Parameter w/in the model
  - Mesh sizes/grids
  - Assessment of smoke damage—equipment and operator actions: high uncertainty, but not seems to be significant.
  - Could damage one or two breakers in reality, but we usually only model OPA
  - Manual suppression—how much you should credit the suppression curve? There's a difference between suppression and extinguishing.
  - Error of commission
- FSS-E—selection uncertainty is high. Ex. Thermal conductivity selection. Once you have a choice, uncertainty is low.
- FSS-F—
- IGN-A—state of knowledge, need correlation
- CF-A—we have para, but the curve is shifting, again, it's state of knowledge; G:. Para uncertainty. If you use different data set, you got different values.
  - I don't care if it's modeling or parameter uncertainty

    - Need to update 1855. Important to distinguish those
    - It's good to recognize there is a borderline…
    - (I pause here, since people disagree w/ modeling vs. para. Uncertainties…)
- HRA-C—establish timeline for the actions.
    - Outside the control room actions are more important
- SF-A—
- New area—flood w/ fire: what's the initiator? Don't know if it's really do-a-ble

- Dan: It's not going to lower everything. It changes the internal importances…
- 805—put things in a better places, but for doing decision, big mud… got the tools, got the insights to make improvement.

Seismic
- SHA-C
- (see Michelle's note)

LPSD
- 1st thing: whether the resolution in the model is sufficient to meet the reasons that you do the analysis
- 1855: not an issue of level of details, but the resolution.
    - One is to drive down the uncertainty numerical number.
    - Identify issues—completeness issues
- We didn't characterized those that can be driven down by improving the PRA model.
- Couldn't always determine the significance of all issues due to lack of experience
- I agree w/ that if you're only dealing w/ the base PRA, but I think you have to look at the application prospective compared to the base case.
- Early vs. late transition
    - Early and mid-loop has lower frequency
- Completeness issues
    - Examples (see slides)
    - Mid-loop early and late—lets say successful of FB as a cutoff…
- POS
- Expert judgement
- Model/completeness issue—not only LPSD, but for at power.
- What do you mean by safe stable ?
- Continuous refill CST? Or operating 1' function that can lead to safe stable state? How do you define it?
- Lack of community experience, community review, codes not available for LPSD
- Brookheaven report 6595—for CDF and LERF, we simply ask questions about the CETs
- At power is mostly automatic; but LPSD→ a lot more HRAs. →post initiator HFE, subjectivity of the analysts
- Joint NRC-EPRI project for HRA→may help w/ how to handle dependency. Currently about procedure driven HRAs for at power, but may be highly related to LPSD
- SD procedure doesn't exist for some scenarios…
- Did your group talk about international discussions on LPSD? Compare different studies and see different level of details may be a good source.
- Most HRAs…depends on how the plant is going to responds when you have loss of decay heat removal at different conditions. It's a completeness issue.

- How much it looks like shutdown, how much it looks like at power? Need to sort this out first for the model.
- L1 success criteria and L2 success criteria maybe applicable to SD… brench mark or need to do something reasonable just like you transfer the criteria from xxx to C-STGR…
- Don't have fire procedure at SD.

Level 2

- LERF is pretty well established, but we want to look at the full bloom Level 2
- We limit ourselves for the discussion w/in at power condition, though some LPSD may involved
- L1/L2 interface:
  - Potential concerns about loss of information from L1 to L2
  - Are all the sequences properly grouped into the PDS?
  - For new reactors, there's a lack of knowledge, but for the operating reactors, do we have a good handle of PDS? Some people disagree that it's high.
  - Partial/degraded performance didn't get credited in L1, ex. CRD may be credited for longer time…
  - Dynamic load
  - Seismic induced leakage
  - Quasi-steady failure…leak before break type…may have more impact on L3.
  - Ageing—low based on nuregcr6920
  - Onset of fuel relocation
  - Energetic containment challenges
  - Probabilistic treatment—refer to Garreth…
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- Trying to get a sense of the relative importance of all these…
- How we should structure the findings and details for the public report?
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