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To: Mike Cheok

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cc: Glen Kelly

Comments: Comments/questions on INEEL report on SFP risk

There are a number of inconsistencies, confusing statements, and potential inaccuracies in the report.

General Comments

1. On page 5, the SFP make-up pump is said to have a capacity of 20-30 gpm. On page 62, the small leak, i.e., that within the capacity of the pump, is assumed to have a flow of 10-15 gpm. Since it will make little difference to the calculation, wouldn't it be better to assume the small leak has a size equivalent to the capacity of the pump (the question now is 1 pump or 2?). (Editorial)

2. For the large leak, the rate should be chosen to be what is likely to be the largest rate, not arbitrarily (?) chosen to be 50-60 gpm, (unless of course there is a good reason to believe that this is most probably the largest leak rate. (Editorial)

3. For a discussion of event IND for those cases where there is no loss of inventory, success implies that the SFPC system suction has not been uncovered. The "model" is based on procedural errors, i.e., failure to follow procedure etc, but not on failure to notice the peripheral indications such as high temperature and humidity. These additional cues should be quoted as examples why the number calculated, even though small, may not be too small. (Editorial)

4. The failure rate for an instrument channel of 1E-05 is, I believe, a per hour rate, and should be converted into a per demand number. I'm wondering whether we need this term at all since we already have a per demand failure term.

5. The NEI commitment letter discussed the inclusion in the onsite restoration plan of provision for remote alignment of the makeup source to the spent fuel pool without requiring entry to the refuel floor. This does not appear to provide much benefit if the fuel pool makeup system is incapable of taking away decay heat.

Loss of Cooling Event Tree

6. There is a potential dependency between HEP-RECG-FWSTART and the repair term for

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the event OCS in that there could be a focus on repair to the detriment of taking contingency measures. However, if the plant practices are to monitor the pool, and the procedures require action once the pool boils, or when the suction is uncovered, this event can be treated as if it were independent. We should add a discussion of what it takes to claim independence.

Fire Initiating Event

7. The fires of interest need to be defined/discussed more carefully. All fires are assumed to lead to loss of SFPC if not suppressed, however, it is also recognized that because of the low voltage and low combustible loadings, fires are not likely to spread. However, it is also stated that the spent fuel pumps are close together and they will both be damaged if the fire is not suppressed in 20 minutes. Maybe all this should just be cleaned up and stated much more simply, cutting out all the extraneous discussion.

8. For the fire event tree, it could be argued that the event IND has another cue, and that is the fire itself which is more likely to catch the eye during the walkdown. However, it seems to be assumed that the fire is ultimately self extinguishing, since for the CRA failure branch, there is no specific extinguishing term, and IND again refers to noting that there is a loss of cooling.

9. For the fire event tree, the events OMK and OFB can be treated just like those in the LOC event tree as long as there is an assumption that the fire has not created conditions that would hamper the activities. Given the long time available, it is probably not a concern.

Loss of Offsite Power Event Tree

10. I'm not sure we need the Top Event IND in this case. It will be obvious that the spent fuel pool cooling has been lost. Any "diagnosis" should be included in the OCS event. Certainly the sensitivity case of 5E-03 for the recognition is too high.

11. The heading on the event tree for event OPR needs to be clarified. It is recovery before loss of spent fuel pool cooling, not uncovery. For the severe weather event tree it may indeed be fuel uncovery even though the probability is calculated for 24 hours. But then why would you need the branch at all?

12. Maybe the two trees should be combined.

Loss of Inventory Event Tree

13. Shouldn't the values for HEP-DIAG-ALARM be different for the two leak size cases, since there could be as little time as 2 hours for the large break and as much as 24 for the small break? The HEP of 3E-4 is based on a long time, allowing for two shifts to respond to the alarm. This is OK for the small leak, but not for the large. The success path for the

small leak implies that the recognition is done quickly enough to allow prevention of the loss of pool cooling by starting the make-up pump (see discussion in section 4.5.6.1).

14. In the discussion of IND for the small leak loss of inventory case, we shouldn't be talking about hot and humid environment since the success criterion is related to identifying the loss of coolant before it leads to a loss of SFPC. The event OIL is effectively compensating for the leak and preventing loss of SFPC. The low HEP for IND in this case, comes from several opportunities for new shifts to notice the problem. If it takes three shifts, there will be correspondingly less time to execute OIL. I think HEP-MKUP-START-E should be higher than it is, and use the value for the function LOI-OIL-L.

15. For the small leak OMK event, the starting point is different from the same event in the other cases, where the cue to start was pool boiling. Here it is loss of pool cooling that is the primary cue. It can be argued that since on these sequences the operators know that they have to restore inventory, that there should be no significant dependency between events OIL and OMK, particularly if the cue is clearly in the procedure to use FW if the pool cooling is lost and the leak is unisolated.

16. For the large leak case, the success criterion for IND is not clear. It is assumed (section 4.5.5.3) that given success there is no time to start the make-up system, which seems to imply, probably correctly, that the pool level has dropped below the cooling system suction. However, even on the success branch, i.e., isolation successful, you now have to add makeup and possible restart the SFPC system. I guess this is possible if the pool has not started boiling. But once boiling has started, the make-up pump will not keep up (assumption), and you'd have to start the fire water system. Perhaps this event has to be redefined as failure to notice the leak and start the make-up system before boiling, and also start the SFPC system. The thermodynamics of this could get complicated, because the lower the level gets, the quicker the heat up and the shorter time to start the makeup pump. However, there is an assumption that the level will not drop below 15 feet. Maybe we can use that somehow. In any case, we have to fix the sequence 14.

17. Should the event OIS have a contribution that represents the probability that the leak cannot physically be isolated? I'm not sure we could estimate the probability, but it would serve to illustrate the fact that we need some assurance that all potential leak paths have been reviewed to minimize this likelihood. NEI has two commitments related to this.

18. One of the problems is that the operator events are associated with changes in pool status that allow different strategies. So in the LOC tree, the IND is essentially associated with giving enough time to fix the SFPC system to prevent boiling off three feet of water. However, failure does not mean the fuel will fail. You still have another chance when the pool begins to boil to use the other strategies. However, we don't need to develop the sequences on the IND fails branches because the frequencies are low enough anyway.