April 8, 2002

MEMORANDUM TO: Richard J. Laufer, Chief, Section 1
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

FROM: Timothy G. Colburn, Senior Project Manager, Section 1 **/RA/**
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FAXED TO THE LICENSEE RE: SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2 (SSES 1&2), ELIMINATION OF HIGH PRESSURE COOLANT INJECTION (HPCI) AUTOMATIC SUCTION TRANSFER (TAC NOS. MB2190 AND MB2191)

The technical review staff e-mailed me the attached questions which have been faxed to the licensee on March 25, 2002, regarding the Nuclear Regulatory Commission staff's review of the licensee's application dated June 8, 2001. These questions were discussed with the licensee on March 25 and 26, 2002, prior to initiating a formal request for additional information, in order to determine whether the information has been previously placed on the docket. Question 14 from the enclosed list has been determined as being unnecessary and will not be sent to the licensee. The remaining questions will be formally transmitted to the licensee.

Docket Nos. 50-387 and 50-388

Attachment: Request for Additional Information

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REQUEST FOR ADDITIONAL INFORMATION FAXED TO SSES 1 & 2

Review Questions for Containment Load Calculations To Support The Elimination of HPCI Suction Transfer On High Suppression Pool Level For SSES 1 & 2

Questions about Calculation EC-ATWS-0505 Rev.8

1. A lot of SABRE input deck data in Appendix D came from the document PL-NF-89-005, Rev.0. Has the transient analysis method mentioned in this document been submitted to NRC for approval before? How about the data?

2. On Page 235, the loss coefficient of the fuel spacer is calculated by the correlation for ANF9x9 fuel. Does this correlation still apply to the current cycle? If not, what is the impact?

3. What kind of post-processing package has been used to extract graphical data from SABRE output? Can it be made available to NRC?

4. It is observed that SABRE code uses different time step size for thermal-hydraulic calculation and neutronics calculation. How is core power calculation synchronized with the fluid and heat transfer calculation? When different time step sizes are used, what is the impact on the accuracy?

Questions about Calculation EC-052-1018

5. If the proposed change is made to the plant, will the HPCI source auto-swap from CST to suppression pool triggered by low CST water level still remain? If it does, is there a concern that the HPCI may fail during the ATWS? How long does it take to reach the low-level CST transfer and has this been considered or modeled in the risk evaluation?

6. The proposed new EOP requires a manual HPCI suction swap from the CST to the suppression pool if pool level reaches 25' and the suppression pool temperature is less than 140 ^{o}F. Technical Specification states 24' maximum limit. Why is there such a difference?

7. Has the containment load-limit curve described in Eq. (1) on Page 7 been submitted to NRC for approval before? If not, what is the basis of using it?

8. What is the elevation difference between the HPCI turbine outlet (not the exhaust line) and the suppression pool normal water level?

9. Are all the SRV discharge line vacuum breakers located in the drywell? If they are, do we expect that the water level in the SRV discharge line is lower during LOCAs?

10. On page 16, the third paragraph states "Problem 2. With ...., may reach 27.2 feet....". Does EOP require suppression pool letdown when pool level is higher than 25' ? If it does, what is the basis for this statement?

Enclosure

REQUEST FOR ADDITIONAL INFORMATION FAXED TO SSES 1 & 2 CONTINUED

Questions about Calculation EC-RISK-1083

11. In Section 2.5, two operator actions are identified to prevent water hammer damage to HPCI. Both actions are tied to the 26-foot level of the suppression pool. However, in Attachment 1 of the June 8, 2001 submittal on page 32 it states that "Because of the uncertainty associated with restarting the HPCI system under conditions of high suppression pool level, the system would not be restarted if suppression pool level is greater than 25 feet." Based on the submittal, these actions would not be taken and should not be credited in the analysis, as the level would exceed 25 feet. Did the PRA evaluation include credit for either of these actions? If so, please explain the apparent inconsistency between the submittal and the risk calculation and identify what the impact would be on the results if these actions were not credited?

12. Based on Attachment 1 of the June 8, 2001 submittal on page 32, the exhaust line will begin to fill at 25.1 feet and be completely filled when the pool level reaches 27.2 feet. The potential for failing HPCI on a restart is stated to be of concern if the suppression pool level is greater than the 25.1-foot level. This is why there is the restriction on the HPCI pump restart if the level is above 25 feet. Section 2.8 identifies a credible error in implementing the manual transfer that would cause the HPCI pump to trip, but then states this potential error has no consequences due to its brevity. It is not clear how long after the alarm signal is received that the operators will begin to execute the manual transfer. If there are procedural delays/confirmations or other factors that impact the initiation of the manual transfer, the transfer may occur approximately at the time the suppression pool level is actually reaching the 25-foot level. If the HPCI pump trips during the manual transfer at this time, then in accordance with the original submittal a restart of the HPCI pump would not be allowed. Therefore, the identified operator error may have a direct impact on HPCI success and should be modeled as a potential failure mode of the system. Please explain the timing and associated factors leading up to the operator taking the steps to perform this manual transfer and if there is the potential for this operator error to result in a trip of HPCI at about the 25-foot level, please revise the model to reflect this potential failure mode of HPCI during the manual transfer and provide the revised results.

13. Section 4.1.1 indicates that HPCI success is conditioned on SBLC operability. However, the event tree reverses these two top events. In addition, for the current condition, based on Section 4.1.1, sequences ATWS_7, ATWS_8, and ATWS_9 are not possible since SBLC is failed, which should actually guarantee failure of HPCI and thus MRI. The event tree logic resulting in these sequences is incorrect and should have no results. Further, it is not clear from the event tree if different results would be achieved if these two top events were reversed and credit was given for the potential to use RCIC, CRD, and SBLC, as identified in this section. Please provide the CDF/LERF results for the above identified sequences pre- and post-modification. Also, please identify the impacts of switching the event tree top logic and provide the revised requantified results using this revised event tree.

14. Section 4.1.2 identifies a potential operator error that would fail HPCI that is not modeled because "It is thought that if the operator manually initiates the suction swap he would also ensure HPCI was running and if he failed in one he would fail the other." In determining the

HEP for the manual transfer, was this potential operator error factored into the value? If not, then the HEP is optimistic and assumes 100 percent success for the operator ensuring HPCI is running. In determining dependencies between operator actions, it is appropriate only when both actions must occur to result in system failure (i.e., multiple), but it is not appropriate to screen out an action when either action can result in system failure (i.e., additive). Please provide the manual transfer HEP and associated bases/calculation parameters. In addition, please revise the model to reflect this other potential operator failure means and provide the revised results.

15. Section 4.1.2 identifies that two operator errors must fail for the HPCI manual transfer to fail. The first is for the operator control of RPV water level, which is described further in Section 4.1.3a. The second operator error involves the error to actually perform the manual transfer, which is described further in Section 4.1.3b. However, the first error analyzed is only for the operators to gain control of RPV water level and does not address the potential for the operators to fail to maintain control of RPV water level. The second operator action would be highly dependent on this unanalyzed operator error of not maintaining RPV water level, especially since this error could occur very near the time needed to perform the transfer, which would result in the operators not restarting the HPCI pump and thus failing the system. In addition, the two identified operator actions may also be highly dependent as both actions use the same timing window, especially if performed by the same operator. Also, if the operator fails to gain control of RPV level, the HPCI pump will trip at RPV Level 8 and not restart until RPV Level 2 is reached, but the times associated with reaching RPV Level 8 and then reaching RPV Level 2 have not been provided. Again, this could put the HPCI being in the tripped state at the time the level in the suppression pool reaches the 25-foot level and would make the two identified operator actions essentially fully dependent. Please revise the model to reflect the potential for the operator error to maintain control of RPV water level to result in the direct failure of HPCI, without any other operator errors needed, discuss and revise the model accordingly to address the potential dependency between the identified operator actions, and provide the revised results.

16. Section 4.1.3b indicates that the alarm is actuated by level switches LSHE411(2)N015A or LSHE411(2)N015A. Was the potential for the failure on demand and pre-initiator time-based failure of both switches and associated signal/relay logics modeled in the SSES PRA evaluation, including the potential for common cause failures. If so, please provide the associated demand and time-related failure probabilities used in the model and their bases. If not, please revise the model to reflect the potential for these failures to fail the associated operator action to perform the manual transfer and provide the revised results.

17. The estimated CDF/LERF results indicate no differences between using the mean, the 95 percentile HEP, and the no operator error results (i.e., HEP=0). Also, the LERF results don't even change when the operator error is assumed certain (i.e., HEP=1). Please explain why there are no differences in these results, though the HEP value is changed, and please provide the subject HEP value(s) used in each of these quantifications.

18. The results for the post-modification using the mean and 95 percentile HEP actually indicates a relatively large risk reduction for small LOCAs (both steam and liquid), which is counter-intuitive to what is expected. A relatively large risk increase is identified for small

liquid LOCAs, if the operator error is assumed to occur, which is expected. The evaluation also indicates a relatively large risk reduction for the RBCCW initiator and for the small steam LOCAs, even when assuming the certainty of the operator failure to perform the manual transfer. These events dominate the risk reduction, though they appear to be either unrelated to the proposed modification and/or are counter-intuitive results. Please describe why and how each of these initiators are impacted by the proposed modification and specifically explain why using the mean and 95 percentile HEP values result in a relatively large risk reduction (factor of 2) for small LOCAs, but assuming certain failure results in an even larger relative risk increase (factor of 15) for small liquid LOCAs. Also, please explain why the modification has an impact on small liquid LOCAs, but not small steam LOCAs when the operator failure is assumed.

19. Similar to the above comment, which is primarily related to the CDF calculations, there are many reductions in LERF that are counter-intuitive and many initiators go from a contribution pre-modification to zero contribution post-modification. Please describe why and how each of the initiators that change in contribution (by absolute value) are impacted by the proposed modification.

20. Given the extremely low CDF/LERF results calculated, what quantification cutoff/truncation CDF/LERF values were used in requantifying the model? Please describe how the selected cutoff values assure that potentially important contributors have not been discarded. If the cutoff value was less than 4 orders of magnitude below the total CDF/LERF, please requantify the model using a cutoff value at least at these values (e.g., 1E-11/year for CDF and 5E-13/year for LERF) and provide the revised results.