April 8, 2002

Mr. Robert G. Byram
Senior Vice President
and Chief Nuclear Officer
PPL Susquehanna, LLC
2 North Ninth Street
Allentown, PA 18101

SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2 - REQUEST FOR ADDITIONAL INFORMATION RE: HIGH-PRESSURE COOLANT INJECTION (HPCI) PUMP AUTOMATIC SUCTION TRANSFER (TAC NOS. MB2190 AND MB2191)

Dear Mr. Byram:

By letter dated June 8, 2001, as supplemented February 4, 2002, PPL Susquehanna, LLC (PPL), proposed an amendment to modify the Susquehanna Steam Electric Station, Units 1 and 2 (SSES 1 and 2), technical specifications to remove the automatic transfer of the HPCI pump suction source from the condensate storage tank to the suppression pool upon receipt of a high suppression pool level. The automatic HPCI pump suction transfer upon receipt of a low condensate storage tank level would be unaffected. The Nuclear Regulatory Commission staff has reviewed PPL's request and has determined that additional information is required in order to complete our review. The additional information required is described in the enclosure. These questions were discussed with your staff on March 25 and March 26, 2002, by telephone. Several questions were eliminated as no longer being necessary or were consolidated into the enclosed list. As discussed with your staff, we request your response by April 30, 2002, in order for our review to remain on schedule.

If you have any questions regarding this correspondence, please contact me at (301) 415-1402.

Sincerely,

/RA/

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

Docket Nos. 50-387 and 50-388

Enclosure: Request for Additional Information

cc w/encl: See next page

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REQUEST FOR ADDITIONAL INFORMATION

RELATED TO REQUEST TO ELIMINATE THE

HPCI AUTOMATIC PUMP SUCTION TRANSFER ON HIGH SUPPRESSION POOL LEVEL

PPL SUSQUEHANNA, LLC

ALLEGHENY ELECTRIC COOPERATIVE, INC.

SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2

DOCKET NOS. 50-387 AND 50-388

Requested Information about Calculation EC-ATWS-0505 Revision No. 8

1. A lot of SABRE computer code input deck data in Appendix D came from the document PL-NF-89-005, Revision No. 0 and another RETRAN computer code calculation. It was indicated that these references have been approved by the Nuclear Regulatory Commission (NRC) through approval of previous licensing submittals. Please provide references for all the relevant documents that demonstrate previous NRC approvals.

2. It is observed that SABRE computer code uses a different time step size for the thermal-hydraulic calculation and the neutronics calculation. Please explain how the core power calculation is synchronized with the fluid and heat transfer calculation. Include a discussion of the impact of using a different time step on the accuracy of the calculations. Please also include a comparison between the unsynchronized and synchronized results.

Requested Information about Calculation EC-052-1018

3. It is stated in the calculation that the suppression pool letdown system will be used to lower the suppression pool water level during a small-break loss-of-coolant accident (LOCA) with the assumption of loss of offsite power (LOOP). Please provide the letdown system flow path drawings, relevant portions of the emergency operating procedures (EOPs) and the appropriate documents to demonstrate that the letdown pump motor remains powered during a LOCA/LOOP event. In addition, please provide the suppression pool water level instrument accuracy.

Questions about Calculation EC-RISK-1083

4. In Section 2.5, two operator actions are identified to prevent water hammer damage to high-pressure coolant injection (HPCI). Both actions are tied to the 26-foot level of the suppression pool. However, on page 32 of Attachment 1 of the June 8, 2001 submittal, 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

Enclosure

the probabilistic risk assessment (PRA) 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?

5. On page 32 of Attachment 1 of the June 8, 2001 submittal, it states that 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 coincident with the time the suppression pool level is actually reaching the 25-foot level. If the HPCI pump trips during the manual transfer during 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.

6. Section 4.1.1 indicates that HPCI success is conditioned on standby liquid control (SBLC) operability. However, the event tree reverses these two top events. In addition, for the current condition, based on Section 4.1.1, anticipated transient without scram (ATWS) sequences ATWS_7 and ATWS_8 are not possible since SBLC is failed, which should actually guarantee failure of HPCI and thus manual rod insertion (MRI). The event tree logic resulting in these sequences is not precisely correct 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 reactor core isolation cooling (RCIC), control rod drive (CRD), and SBLC, as identified in this section. Please provide the core damage frequency/large early release fraction (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, if appropriate, provide the revised requantified results using this revised event tree.

7. Section 4.1.2 identifies that two operator errors must fail for HPCI to fail. The first is for the operator control of reactor pressure vessel (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.

8. Section 4.1.3b indicates that the alarm is actuated by level switches LSHE411(2)N015A or LSHE411(2)N015B. 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 1 and 2 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.

9. The estimated CDF/LERF results indicate no differences between using the mean, the 95 percentile human error probability (HEP), and the no operator error results (i.e., HEP=0). Also, the LERF results do not 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.

10. The results for the post-modification using the mean and 95 percentile HEP actually indicates a relatively large risk reduction for small-break 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 reactor building closed cooling water (RBCCW) system 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.

11. 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.

12. 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.

April 8, 2002

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