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HEHL,C.W. Region 1 (Post 820201)

SUBJECT: Forwards response to NRC concerns identified in 901231 ltr re reactor coolant pressure boundary concern.Risk of HPCI or RCIC steam line failure by thermal shock as result of spraying by fire protection deluge sys negligible.

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FEB 28 1991

Mr. Charles W. Hehl, Director
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Region I
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SUSQUEHANNA STEAM ELECTRIC STATION
RESPONSE TO REACTOR COOLANT PRESSURE
BOUNDARY CONCERN
PLA-3530 FILE R41-2

Docket Nos. 50-387
and 50-388

Dear Mr. Hehl:

This letter provides Pennsylvania Power & Light Company's response to the NRC reactor coolant pressure boundary concern identified in your letter dated December 31, 1991.

NRC required submittal of a written reply within sixty (60) days of the date of the letter. No personal privacy, proprietary or safeguards information are contained in the response. We trust that the commission will find the attached response acceptable.

Very truly yours,

H. W. Keiser

Attachment

cc: NRC Document Control Desk (original)
NRC Region I
Mr. G. S. Barber, NRC Sr. Resident Inspector
Mr. J. J. Raleigh, NRC Project Manager

A001

1.0 SUMMARY

On December 31, 1990, NRC Region I requested the PP&L Senior Vice President-Nuclear to investigate, disposition, and reply to a concern about reactor coolant pressure boundary integrity. The concern involved the interaction of cold water from an inadvertent fire protection system initiation in the high pressure coolant injection (HPCI) and reactor core isolation cooling (RCIC) rooms while the turbines are running.

Investigation revealed that the HPCI and RCIC turbines and the steam lines leading to them, which could be sprayed by an inadvertent fire protection deluge system initiation, are well protected by thermal insulation. Thus, the cold water spray would be prevented from directly contacting the hot components. In addition, a significant breach of either a HPCI or RCIC steam line by any mechanism would result in the automatic isolation of the steam lines upstream of the respective room to maintain the reactor coolant pressure boundary. A deluge of water could, however, affect the HPCI or RCIC controls and could render either system inoperable. That contingency has been evaluated and determined to be within the design basis of the plant. Therefore, the reactor coolant pressure boundary would not be jeopardized by an inadvertent actuation of the HPCI and RCIC room fire protection systems while the turbines are running.

2.0 BACKGROUND

On December 31, 1990, the Director of Reactor Projects, NRC Region I, brought to the attention of PP&L's Senior Vice President-Nuclear a concern about reactor coolant pressure boundary integrity. The forwarding letter requested that PP&L investigate the concern raised, disposition the issue in question, and advise Region I of the results within 60 days. The Region I letter also stated that the enclosure detailing the concern should be distributed to a limited number of personnel with a need to know.

The essence of the concern was that cold water from an inadvertent actuation of the fire protection system in the high pressure coolant injection (HPCI) and reactor core isolation cooling (RCIC) rooms while the turbines are running could interact in such a way as to compromise the integrity of the reactor coolant pressure boundary. In order to determine if there was more information available about the concern than stated in the letter enclosure, Mr. W. R. Licht of NSAG phoned Mr. Paul Swetland, the Region I designated point of contact. Mr. Swetland stated that he had no more details about the concern than were stated in the letter enclosure. It appeared to him to be a question of the possible interaction of cold water on hot pipes.

3.0 DISCUSSION

An event involving an inadvertent actuation of a fire protection deluge system that did result in the loss of reactor coolant inventory was reported in IE Information Notice 85-85: Systems Interaction Event Resulting in Reactor System Safety Relief Valve Opening Following a Fire Protection Deluge System Malfunction. In the event described, water

from the fire suppression deluge system in the control room ventilation charcoal filter housing found its way to a panel and caused shorting that resulted in the sticking open of a main steam safety relief valve, with loss of primary system inventory.

The initial PP&L evaluation of the applicability of IEN 85-85 to SSES addressed protective devices and actions for safety-related charcoal systems. A second evaluation (IEN 85-85R1) addressed a concern about a path by which HPCI and/or RCIC may be made inoperable through the inadvertent actuation of their deluge systems. This second evaluation acknowledged that water induced damage to control systems could result in system inoperability. It noted that the effects of inadvertent water application would be less than fire damage. In either case the safe shutdown analysis for 10CFR50, Appendix R, demonstrates that safe shutdown can be accomplished without using HPCI or RCIC. Chapter 15 of the SSES FSAR demonstrates that sufficient redundancy exists to mitigate all accidents if HPCI is not operable. Since RCIC is not relied upon to mitigate any accident condition, its damage by an inadvertent deluge system operation independent of, or concurrent with, the HPCI deluge system operation would not affect plant safety. The evaluation concluded that plant nuclear safety is not compromised by the existing HPCI and RCIC fire protection systems and that modifications to prevent water damage are not justified.

In response to the recent letter from NRC Region I, a third evaluation was undertaken to address an inadvertent actuation of the fire protection systems while the HPCI and RCIC turbines are running and the concern that interaction of cold water could compromise the integrity of the reactor coolant pressure boundary. First, it is noted that the actuation of the HPCI and RCIC deluge system are totally independent of each other, both locally and in the control room. Therefore, the probability of inadvertent actuation of both systems simultaneously is remote. Second, the HPCI and RCIC turbines are insulated and the steam lines in the HPCI and RCIC rooms are covered with thermal insulation that has a metallic outer surface. Thus, cold water from the fire suppression system cannot readily come in contact with the turbines or the steam pipes. It should be noted that if the steam line to either HPCI or RCIC rooms were breached by any mechanism whatsoever, the high room temperature would cause the steam supply to be automatically secured upstream of the HPCI or RCIC rooms to maintain the reactor coolant pressure boundary. The water could, however, affect the HPCI or RCIC controls and might well render either system inoperable. That situation was evaluated and dispositioned previously in IEN 85-85R1.

4.0 CONCLUSION

The concern is not valid.

- The risk of HPCI or RCIC steam line failure by thermal shock as a result of being sprayed by the fire protection deluge system is negligible. The pipes are protected by thermal insulation.
- In the unlikely event that a failure of either steam line would occur, the system would automatically isolate.

- Some risk exists that the HPCI or RCIC systems could be rendered inoperable by an inadvertent actuation of the fire protection deluge system. This event has been evaluated and the design has been shown to meet NRC requirements.

nsagsumm.wrl(14)