PECO ENERGY

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September 28, 1995

Docket No. 50-278

License No. DPR-56

U.S. Nuclear Regulatory Commission
Attn: Document Control Center
Washington, DC 20555

Subject: Peach Bottom Atomic Power Station, Unit 3
Core Spray In-Vessel Piping

References:

1) Letter from G.A. Hunger, Jr. to U.S. Nuclear Regulatory Commission dated November 5, 1993

2) Letter from G.A. Hunger, Jr. to U.S. Nuclear Regulatory Commission dated November 10, 1993

3) Letter from G.A. Hunger, Jr. to U.S. Nuclear Regulatory Commission dated December 8, 1993

4) Letter from G.A. Hunger, Jr. to U.S. Nuclear Regulatory Commission dated June 13, 1995

Dear Sir:

This letter provides additional details to address concerns raised by the NRC during the review of our request made in reference letter 4.

In reference letter 4, PECO Energy requested the NRC's conditional approval to defer installing a repair or performing volumetric examination (i.e., Ultrasonic inspection) to the indicated crack in a sleeve of the "B" loop of the Peach Bottom Atomic Power Station (PBAPS) Unit 3 Core Spray Sparger Downcomer. During the Fall 1993 refueling outage (3R09), indications of a crack were discovered in the outer sleeve of a slip joint in the 172.5° azimuth Core Spray downcomer of PBAPS Unit 3. In reference letter 1, PECO Energy provided the NRC with details of the crack indication. Reference letter 2 provided additional details of the crack indication, and an analysis in support of returning to operation. In reference letter 3, PECO Energy Company committed to determining the ultimate resolution of this issue prior to returning to operation from the next refueling outage (i.e., September 1995, 3R10.)

The downcomer in the area of the crack indication is unique; the sleeve, where indications of a crack were found during 3RO9, surrounds and is welded to an inner pipe. The configuration of this joint is similar to a slip joint, if the weld were not present. This joint has been analyzed to remain intact under Design Bases Accident (DBA) conditions. This analysis was submitted to the NRC in reference letter 2. To support this analysis, a more detailed analysis was performed by GE Nuclear Energy, which addressed the integrity of the inner pipe. This detailed analysis entitled "Evaluation of Peach Bottom Unit 3 Core Spray Line", GENE-523-A092-095, DRF 137-0010-8 is provided as Attachemnt 1 to this letter. This document was reviewed and approved by the PBAPS Plant Operations Review Committee. In performing this analysis, GE Nuclear Energy performed a finite element elastic-plastic residual stress evaluation, and it shows that compressive stresses are on the outside surface of the pipe in the vicinity of the crevice and the Heat Affected Zone (HAZ) of the weld. The presence of the compressive stresses would inhibit crack initiation at this location. Further, the HAZ for the critical core spray pipe cross section likely only penetrates to approximately one-half of the pipe wall thickness. Thus, even if crack initiation is hypothesized to occur in the pipe, it is unlikely that significant through-wall cracking would occur. The details of the evaluation are provided as Attachment 2.

Since IE Bulletin 80-13 was issued, there have been approximately 238 refueling outages at U.S. Boiling Water Reactors (BWR) with similar Core Spray downcomers. During each of these refueling outages, the BWR licensees have performed visual inspections of each of the four Core Spray downcomers, and no crack indication of this specific slip joint location, except for the crack indication on the sleeve at PBAPS, was identified in any of the approximately 950 inspections. This field experience, coupled with the shroud head bolt experience detailed in Attachment 1, suggests that in this geometry it is reasonable to assume no cracking at this specific location in the core spray pipe.

Based on this analysis, PECO Energy is confident in the structural integrity of the overall core spray pipe joint, and we re-reviewed the Emergency Core Cooling System (ECCS) flow analyses submitted in reference letter 2. We remain convinced that even with the Core Spray piping in a degraded condition, margin exists to maintain adequate core cooling. The first level of ECCS analysis assumed the crack indication was a through-wall crack. The resultant leakage through the sleeve would not be sufficient to invalidate the core spray flow used in the licensing basis SAFER/GESTAR LOCA analysis. A second level of ECCS flow analysis was performed, which assumed the extremely unlikely complete failure of the core spray pipe. This nominal analysis was also submitted in reference letter 2, and shows the expected Peak Cladding Temperature without core spray credit for one loop will remain low (<1200° F).

A Peach Bottom specific Probablistic Safety Assessment (PSA) was also performed. With one loop of Core Spray deemed to be unavailable for all transient types, there is approximately a 3.5% increase in the Core Damage Frequency (CDF). This PSA analysis shows the relative importance of the Core Spray system in accident mitigation. A second PSA analysis was completed to address the complete severance of the Core Spray pipe at the downcomer. A complete severance of the Core Spray pipe will result in Core Spray loop unavailability in recirculation line breaks only. The first PSA analysis assumed no Core Spray flow for all transients. When the model was modified to make Core Spray unavailable for large and medium LOCA sequences (i.e., recirculation line breaks) the resultant increase in CDF was less than 3%. A third PSA analysis was performed, which factored in the probability of a known crack in Core Spray piping propagating to catastrophic failure. When this value is factored into the second PSA analysis there is essentially no effect on the CDF.

We request that the NRC review our existing analysis, in conjunction with the additional analysis provided in this letter, and approve deferring installation of a repair. PECO Energy is seeking deferring repairs until the comprehensive effort by the BWR-VIP identifies appropriate actions. At that time, PECO Energy will review the actions and develop an approporiate response. The BWR-VIP effort has identified the Core Spray piping as a priority for the development of inspection, repair and mitigation strategies. This VIP guidance is expected to provide a sound and logical approach to address potential degradation in the Core Spray system, and represents the most economical, standardized, and practical solution to this issue.

PECO Energy will be performing a visual inspection of the Core Spray piping in accordance with I.E. Bulletin 80-13 during the current outage, and we will provide to you the results of our visual inspection prior to returning to operation. We do not expect to find anything beyond our current projected crack growth on the sleeve; however, any discovery beyond this condition will cause us to reassess our corrective action.

Since the outage is currently underway (started September 22, 1995), and may end up shorter than the currently scheduled 34 days, and we plan to begin our inspection of the Core Spray piping on October 1, 1995, we are requesting your prompt attention to this matter.

If you have any questions please feel free to contact us.

for G. A. Hunger, Jr., Director
Licensing Section

Attachments

cc: T. T. Martin, Administrator, Region I, USNRC
W. L. Schmidt, USNRC Senior Resident Inspector, PBAPS