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November 10, 1993 Docket No. 50-278

STATION SUPPORT DEPARTMENT

License No. DPR-56

JEII

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

Subject: Peach Bottom Atomic Power Station, Unit 3, Supplemental Information Regarding Core Spray Sparger Cracking

> Reference: G. A. Hunger to US Nuclear Regulatory Commission, November 5, 1993

Dear Sirs:

The above referenced letter was submitted in response to IE Bulletin (IEB) 80-13, "Cracking in Core Spray Spargers", which required, in part, that in the event cracks are identified in the Core Spray piping, an evaluation be provided to the NRC for review and approval prior to return to operation. Indication of a crack in the core spray piping of the Peach Bottom Atomic Power Station, (PBAPS) Unit 3 was discovered during the ninth refueling outage. In accordance with IE Bulletin 80-13, an evaluation report performed by General Electric (GE) to support restart and continued operation through the next operating cycle of PBAPS, Unit 3, was forwarded to the NRC. During the review of this evaluation report the NRC had a question regarding the indicated crack. The purpose of this letter is to address this concern and forward the attached GE evaluation.

As discussed in previous correspondence, indication of an approximate 3 inch crack was identified on the pipe sleeve of the "D" Downcomer of the "B" Core Spray Loop sparger. The downcomer is located between the vessel penetration and the core shroud in the annulus region of the vessel. Our initial evaluation estimated crack growth through the next operating cycle and determined that the crack would not propagate to a point where Emergency Core Cooling System (ECCS) flow or pipe stability would be jeopardized. The NRC was concerned that because a volumetric examination of the crack could not be performed the crack growth estimate was not conservative.

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In response to this concern, PECo has performed two additional evaluations. The first evaluation which assumed a 360 degree crack on the Core Spray Sparger, determined that the slip joint would remain engaged when the Core Spray System is initiated in response to a Loss of Coolant Accident (LOCA) and that the resultant Core Spray flow leakage through the crack is within acceptable margins. The slip joint dimensions are such that the joint will stay engaged during a Core Spray initiation. The subsequent leakage through the crack was determined to be approximately 300 gpm. This value is well within the margins defined in the SAFER/GESTR-LOCA analysis.

The second evaluation assumed that the pipe severed and became disengaged from the slip joint, and that another most limiting failure occurred. While this scenario is extremely unlikely given the analysis that was discussed above, the peak fuel cladding temperature remained significantly below 2200 degrees Fahrenheit. The analysis that was performed used nominal values expected at PBAPS.

PECo has revised the 10CFR50.59 Review to incorporate this supplemental information, and has reaffirmed our conclusion that there is no unreviewed safety question. NRC approval prior to the restart of Unit 3 is requested solely because of our commitment made in response to IEB 80-13. Based on the current status of outage close out activities, it is expected that NRC review and approval of this issue will be the critical path activity. Therefore an expeditious review is requested.

G. A. Hunger, Jr., Director,

Licensing Section

Enclosures: Attachment

cc: T. T. Martin, Administrator, Region I, USNRC W. L. Schmidt, Senior Resident Inspector, PBAPS W. P. Dornsife, Commonwealth of Pennsylvania

ATTACHMENT 1

PEACH BOTTOM ATOMIC POWER STATION UNIT 3 - DOCKET NOS 50-278 CORE SPRAY SPARGER CRACKING



GE Nuclear Energy

P.2

November 10, 1993

General Electric Company 175 Curtner Avenue, San Jose, CA 95125

Frank Cook Senior Manager, Design Engineering Peach Bottom Atomic Power Station Philadelphia Electric Company RD #1 - Lay Road Delta, PA 17314

Subject: Additional Evaluation of Peach Bottom Unit 3 Core Spray Line Crack.

Reference: GENE-637-040-1193, Rev. 0 "Core Spray Crack Analysis for Peach Bottom Unit 3"

Dear Mr. Cook:

The following analyses have been performed to supplement the reference analysis of the crack indication observed during the current refueling outage in the Peach Bottom Unit 3 core spray line. These analyses were done to address NRC concerns regarding the potential for a crack extending through-wall and 360° around the circumference of the sleeve.

Pipe Displacement and Leakage with 360° Through-Wall Crack

The ANSYS model described in Section 3.2 of the reference was used to calculate the core spray line movement if the crack were to extend through-wall around the full circumference of the sleeve. The changes to the model were to assume the pipe was unrestrained at the location of the crack with a vertical force applied to account for loads on the line due to core spray flow. Seismic and dead weight loads were considered in the analysis as described in the reference. The vertical displacement of the pipe was calculated to be 1.1 inch. A second analysis was done which is more representative. In this analysis, the pipe was allowed to only move vertically at the crack location. With this more representative restraint and the same loads, the displacement was calculated to be 0.7 inch.

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The calculated displacement is less than the sleeve engagement length which is estimated to be approximately 2 inches. Therefore, the leakage flow will be controlled by the annular flow area between the inner and outer pipes. Using this flow area and a differential pressure across the flow path of 150 psid, the leakage was calculated to be less than 300 gpm. This leakage flow is small compared to the margin of 1250 gpm in the core spray flow demonstrated in recent SAFER/GESTR analyses (NEDC-32163P). The NEDC-32163P analyses, which demonstrated conformance with 10CFR50.46 Appendix K criteria, used a core spray flow rate of 5000 gpm at 105 psig RPV pressure. This flow rate used in the SAFER/GESTR analyses is 1250 gpm less than the Tech Spec requirement (6250 gpm).

This analysis shows that the expected core spray flow into the shroud will exceed the 5000 gpm used for the recent SAFER/GESTR-LOCA analysis even if the indication in the core sprav line were through-wall and extended 360° around the pipe.

Nominal SAFER/GESTR-LOCA Analysis with Failure of Core Sprav Line

To address questions regarding the effect on the LOCA analysis if the pipe were to become disengaged from the sleeve, SAFER/GESTR analysis was performed assuming complete failure of the B core spray line.

This analysis was a "nominal" SAFER/GESTR analysis consistent with NEDC-32163P in that it used more realistic values for initial reactor power, break flow rate, decay heat, etc. than those required for 10CFR50 Appendix K analyses. However, it was bounding in the sense that no credit for any core spray injection from the B loop into the reactor vessel was considered.

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The attached Table 1 summarizes the results for five break/single failure cases which were reported in NEDC32163P to give the highest "nominal" PCT values. Table 1 also shows the results of analyses with the assumption of an additional complete failure of one core spray system. These results show that the increase in nominal PCT with this assumed additional failure is no more than 130°F, and the nominal PCT is less than 1200°F for all of these cases. Although these calculations do not show full compliance with 10CFR50 Appendix K licensing calculations, they do show that the PCT calculated for this assumed degraded condition is significantly below that at which fuel damage is expected.

PREPARED BY:

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APPROVED BY:

J.E. Torbeck, Project Manager

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Effect of Additional Failure of One Core Spray System on Nominal SAFFR/GESTR-LOCA Peak Cladding Temperature

BREAK ¹ SINGLE FAILURE ² BREAK SIZE ³	SYSTEMS REMAINING	PCT (°F) (NEDC 32163P)	PCT (^o F) (Additional Failure of one LPCS)
DSCG, LPCIIV DBA	ADS, 2LPCS, 1HPCI	844.	970.
DSCG, BATT DBA	ADS, 1LPCS 1LPCI	844.	936.
SUCT, LPCIIV DBA	ADS, HPCI, 2LPCS 2LPCI	994.	1074.
SUCT, BATT DBA	ADS, 1LPCS 3LPCI	1024.	1116.
DSCG, BATT, 0.08FT ²	ADS, 1LPCS 1LPCI	1051.	1174.

Note:

- Break Location DSCG - Recirculation discharge line SUCT - Recirculation suction line
- Single Failure
 BATT Battery failure
 LPCIIV LPCI injection valve failure
- (3) Break size DBA - Design Basis Accident